No. 2014-1298

IN THE
UNITED STATES COURT OF APPEALS
FOR THE FEDERAL CIRCUIT

IN RE: ORBITAL TECHNOLOGIES CORP.,

Appellant.

APPEAL FROM THE PATENT TRIAL AND APPEAL BOARD OF THE UNITED STATES PATENT AND TRADEMARK OFFICE, PTAB APPEAL 2013-004262 IN EX PARTE REEXAMINATION NO. 90/011,864 OF U.S. PATENT 7,220,018

BRIEF OF APPELLANT ORBITAL TECHNOLOGIES CORP.

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April 21, 2014

Attorneys for Appellant Orbital Technologies Corp.

CERTIFICATE OF INTEREST

Counsel for Appellant Orbital Technologies Corp. certifies the following:

1. The full name of every party or amicus represented by me is:

Orbital Technologies Corp.

2. The name of the real party in interest (if the party named in the caption is not the real party in interest) represented by me is:

Orbital Technologies Corp.

3. All parent corporations and any publicly held companies that own 10 percent or more of the stock of the party or amicus curiae represented by me are:

None

4. The names of all law firms and the partners or associates that appeared for the party or amicus now represented by me in the trial court or agency or are expected to appear in this court are:

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Respectfully submitted,

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Dated: April 21, 2014

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STATEMENT OF RELATED CASES

No other appeal from the United States Patent and Trademark Office Patent Trial and Appeal Board ("PTAB" or "Board") has previously been made in *ex parte* Reexamination No. 90/011,864 of U.S. Patent 7,220,018, before this Court or any other appellate court.

The Court's decision in this appeal may directly affect or be directly affected by the Court's decision in copending Appeal No. 2014-1299, *In re: Orbital Technologies Corp.*, on Appeal from *Ex parte Orbital Technologies Corporation*, No. 2013-4264 (PTAB October 30, 2013), Reexamination No. 90/011,865 of related U.S. Patent 7,473,008.

The claims of U.S. Patent 7,220,018 were the subject of a Markman hearing in *Orbital Technologies Corp. v. PFO Lighting, Inc.*, 2008 Markman 4735164, 2008 WL 4735164 (unpublished). A0709-16.

JURISDICTIONAL STATEMENT

The Court has jurisdiction over this matter under 28 U.S.C. § 1295(a)(4)(A), providing exclusive jurisdiction on appeal from a decision of the PTAB in a reexamination proceeding. Appellant Orbital Technologies Corporation ("Orbital") filed a timely Notice of Appeal on December 30, 2013, following the final Board Decision in *Ex parte Orbital Technologies Corporation*, No. 2013-

4262 (PTAB October 30, 2013), following Reexamination No. 90/011,864 of U.S. Patent 7,220,018.

STATEMENT OF ISSUES

1. Whether the Board erred when it found that the Examiner was allowed to proceed with the *ex parte* reexamination, when the anonymous third party Requestor failed to comply with statutory and regulatory reexamination requirements, and where the Office is required to vacate the filing date under such circumstances?

2. Whether the Board erred when it found that the Examiner was not required to provide Orbital with the English translation of the primary prior art reference the Examiner relied upon to invalidate Orbital's patent, and that Orbital was not entitled to notice of the Examiner's reliance on a translation, when the Information Disclosure Statement indicated that no translation was considered?

3. Whether the Examiner and Board erred when they found that the machine translation of the Tomofuji patent provided competent evidence of the content of the Japanese language patent, where the translation is in many places incomprehensible and contains untranslatable words, and where the face of the document contains multiple disclaimers as to the accuracy and reliability of the translation?

4. Whether the Board erred when it found that Orbital waived any objection regarding the Examiner's failure to provide the English translation of the primary prior art reference relied on by the Examiner to invalidate Orbital's patent, where Orbital raised the issue in its Response to Office Action and where Orbital was not fully apprised of the issue until after the close of prosecution?

5. Whether the Board's factual findings are supported by substantial evidence, and whether the Board erred in finding a prima facie case of obviousness, where the combination of prior art references would not teach the claimed configuration of elements, and where there was no suggestion or motivation to combine the references?

STATEMENT OF THE CASE

An *ex parte* reexamination of U.S. Patent 7,220,018 ("'018 patent") was ordered September 8, 2011, based on an anonymous third-party Request. A0103; A0287. Orbital appealed to the Board from the Examiner's Final Rejection (PTAB Appeal 2013-004262). A0721. The Board affirmed the Final Rejection, and denied Orbital's subsequent Request for Rehearing. A0002-16[1]; A0018-44. Orbital timely appealed. A1024.

A. The '018 Patent

The '018 patent, MARINE LED LIGHTING SYSTEM AND METHOD, was filed December 15, 2004. The '018 patent issued May 22, 2007, with eight claims. Claims 1 and 5 are independent. A1026-35.

The '018 patent is generally directed to an LED (light emitting diode) lighting system for an open-top marine habitat. Claims 1 and 5 describe an LED light engine comprising a plurality of individual LEDs, mounted to the inner side of a housing, opposite the outer side, so that the LEDs face the open top of the marine habitat when the housing is connected to the top edge. A1034-35. The claims also generally require a controller, a power supply, and a cooling system. *Id.* For example, '018 patent claim 1 requires:

[1] Page numbering in the attached Addendum is consistent with the Joint Appendix.

1. A combination marine habitat and lighting system therefor comprising:

a marine habitat having an open top defined by a top edge and

a lighting system including:

a housing connectable to said top edge to substantially cover said open top, said housing further including an inner side facing said open top when said housing is connected to said top edge and an opposite outer side;

an LED light source mounted to the inner side of said housing, said LED light source comprising at least one light engine having a plurality of individual LEDs capable of providing light at a wavelength from about 380 nm to about 690 nm;

a power supply sufficient to drive said LEDs;

a controller connected with said power source for controlling the activation status and the intensity of one or more of said individual LEDs; and

a cooling system provided in said housing.

A1034. Independent claim 5 is nearly identical to claim 1, except the claimed invention relates to a "lighting system for a marine habitat," rather than a combination marine habitat and lighting system therefor." *Id.*

To promote growth, marine life forms such as coral and algae require light of specific intensity, over a particular wavelength range. A1031. The arrangement claimed in the '018 patent – with the combination of LED lighting system, intensity controller, and cooling system – provides optimal wavelengths necessary to support photosynthesis and biological development of specific marine plant and animal life. A1031-32.

The technology described in the ‘018 patent was a substantial advance over prior systems. The claimed LED light engine provides greater intensity and less radiant heat output than a traditional fluorescent lighting system, with lower operating voltage for improved safety and less heat dissipation. A1031. In addition, LEDs do not experience degradation of wavelength with age, as in fluorescent lighting. *Id.* The ‘018 patent inventors realized that preventing wavelength degradation may also require a cooling system; however, the cooling systems designed for traditional fluorescent lighting arrangements were not suitable for LEDs, because very little heat is actually generated by the LED bulbs themselves. Instead, heat must be drawn off the driver electronics, including current drivers, light engine selection switches, and other electronic components. A1032; A1034. Fluorescent mounts designed to draw air over the bulbs may have little or no effect on an LED light engine, because they do not address the driver electronics. The mounting and cooling configuration claimed in the ‘018 patent is thus critical.

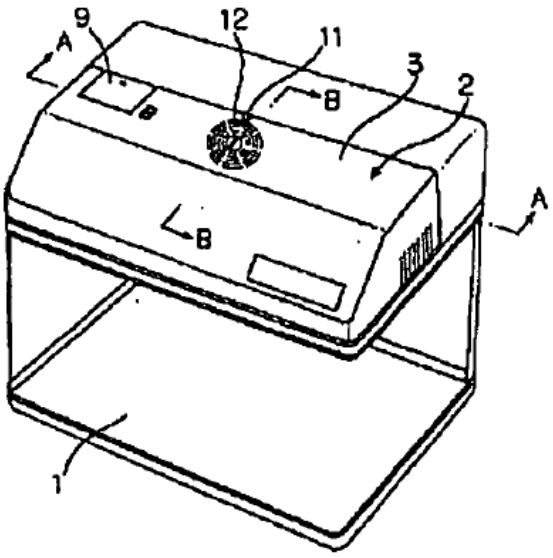
B. The Prior Art

1. Tomofuji[2]

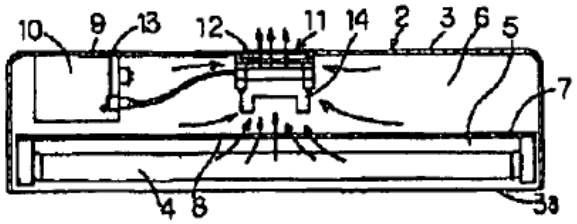
Japanese patent publication No. 09-308409 ("Tomofuji") is generally directed to a device for cooling fluorescent lights in an aquarium fish basin. A0898. In general, Tomofuji describes a fish basin [1] with an illuminator cover [3] mounted on the top, the lower portion of the cover containing one or more fluorescent bulbs [4] mounted to a reflector [7]. The lights are separated from the inner side of the cover [3] by an air space [6]. The illuminator cover contains an air releasing portion [11] comprising vents [12]. The reverse side of the air releasing portion [11] is equipped with a fan motor, designed to generate airflow over the fluorescent bulbs – the source of the heat. A0900.

[2] The discussion of Tomofuji is based, to the extent possible, on the machine translation provided by the Examiner with the Office's Answer. Orbital provides this discussion without waiving its objections based on the translation issues raised in this appeal and below.

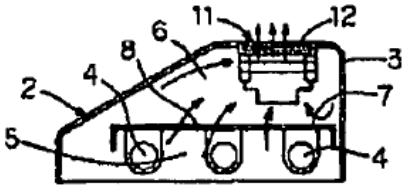
【図1】



【図2】



【図3】



A0893; A0896. Nothing in the Tomofuji cooling system shows how to dissipate heat generated by the LED driver electronics, including current drivers, light engine selection switches, or other electronic components, which were not present in Tomofuji's traditional fluorescent lighting system. A1032; A1034.

2. <u>Kuiper</u>

PCT International Publication No. WO 91/18970 ("Kuiper") is directed to cultivating a phototrophic aquatic organism in an aqueous environment, using artificial light of selected wavelengths from monochromatic light sources. A0184.

There are no figures in the Kuiper reference. Based on the description, the phototrophic aquatic organisms, in particular, relatively fast-growing unicellular

organisms, can be used to remove organic contaminations and inorganic compounds from city sewage or industrial waste water. They can also be used for chemical production, to produce substances found in food, fertilizers, medical preparations and cosmetics. A0184-85.

Kuiper teaches that lamps and other sources of artificial light involve high energy costs, and that sunlight also has relevant limitations. Thus, Kuiper teaches the use of monochromatic light sources, such as LEDs or lasers, where the choice of the wavelength depends on the organism to be cultivated. A0185. Kuiper does not teach the need for cooling, nor does it provide any detail regarding the structure or type of tank that could be used to cultivate the marine life.

3. <u>Lebens</u>

United States Patent No. 6,305,818 ("Lebens") has no relationship to the heating of aquatic environments or the promotion of plant or animal growth. Instead, Lebens is directed to a handheld flashlight or strobe. The flashlight includes a plurality of pulsed LEDs and an electrical circuit that selectively applies power to the LED units, in order to maintain a predetermined light output as the charge or voltage varies, or to control the light output or color spectrum. A0204.

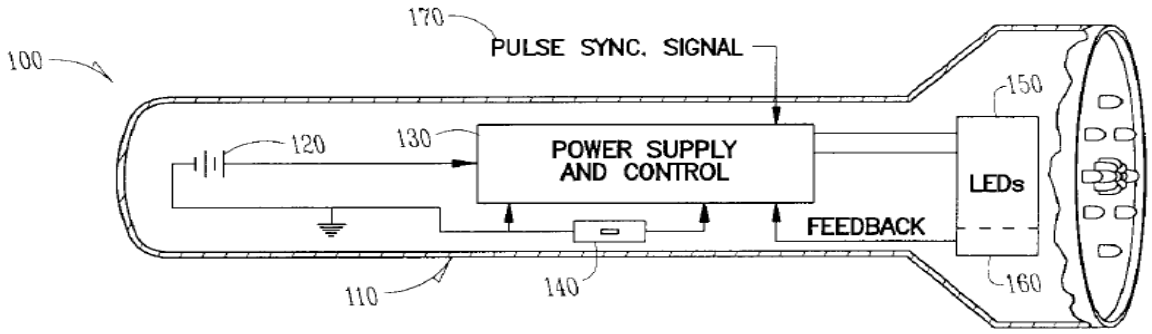


Figure 1

A0205. In one embodiment, for example, a flashlight is used in conjunction with a portable video camcorder or video camera, with a synchronization signal to synchronize the light pulses from LEDs to the video camera frame rate. In other embodiments, a feedback circuit increases pulse width, frequency, or height as the battery voltage or power declines, or a feedback circuit measures the current through LEDs and makes appropriate adjustments to the pulse width or frequency in order to maintain a desired light output. A0219.

4. Ignatius

United States Patent No. 5,278,432 ("Ignatius") is directed to a monolithic array of optoelectronic devices such as LEDs or cold cathode fluorescent devices, with a metal heat sink substrate and a ceramic layer. The LEDs are housed in a modular housing with a power regulating circuit and override features to produce maximum LED output for brief periods of time, particularly to enhance and test plant growth or irradiate samples of living cells. A0234; A0240-41.

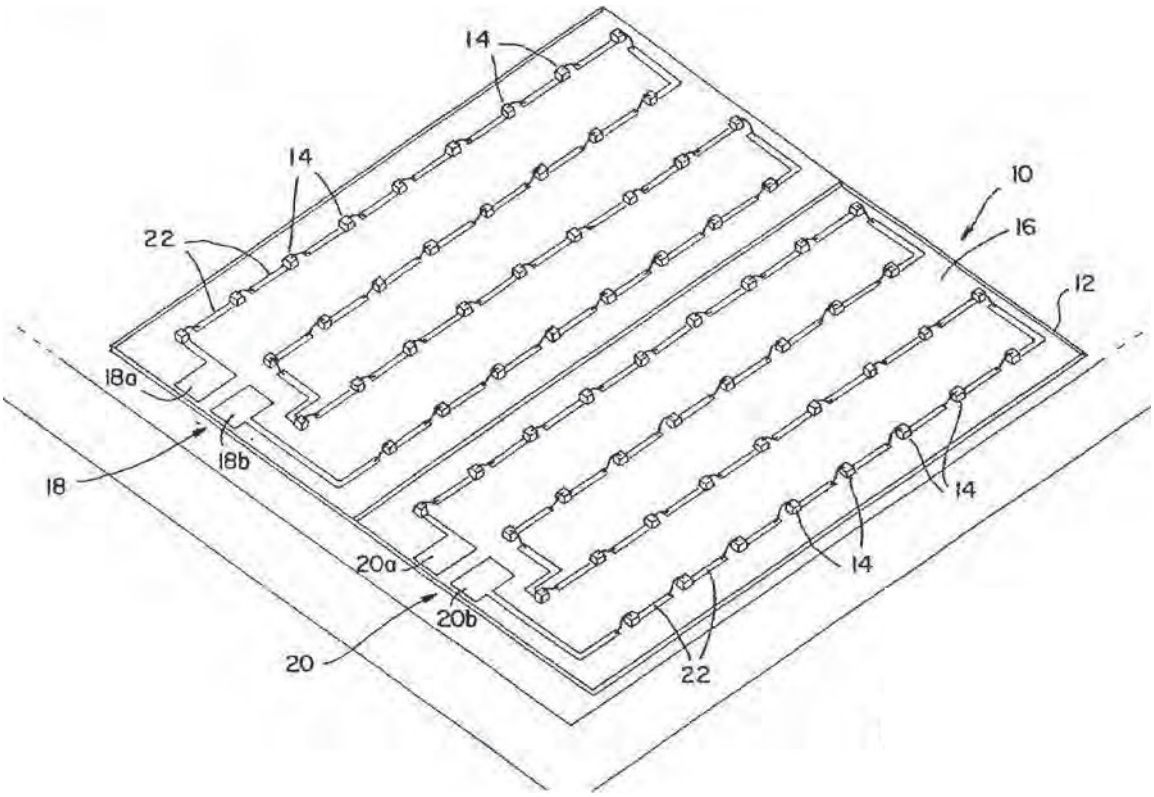


Figure 1

A0235. Figure 1 depicts array [10] of LEDs [14] or other optoelectronic devices, with aluminum or copper-coated substrate [12] to act as a heat sink. A layer [16] of substantially non-conductive material is formed on the substrate [12], preferably a ceramic. LEDs are grouped into a plurality of series-connected sets [18] and [20], each preferably occupying a one inch by two inch area, so that adjacent sets occupy a two inch by two inch area. A0241.

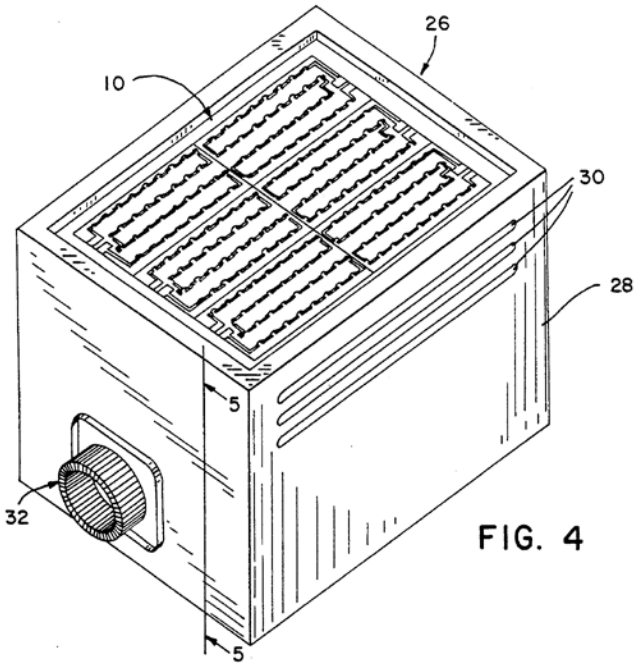


FIG. 4

Figure 4 of Ignatius

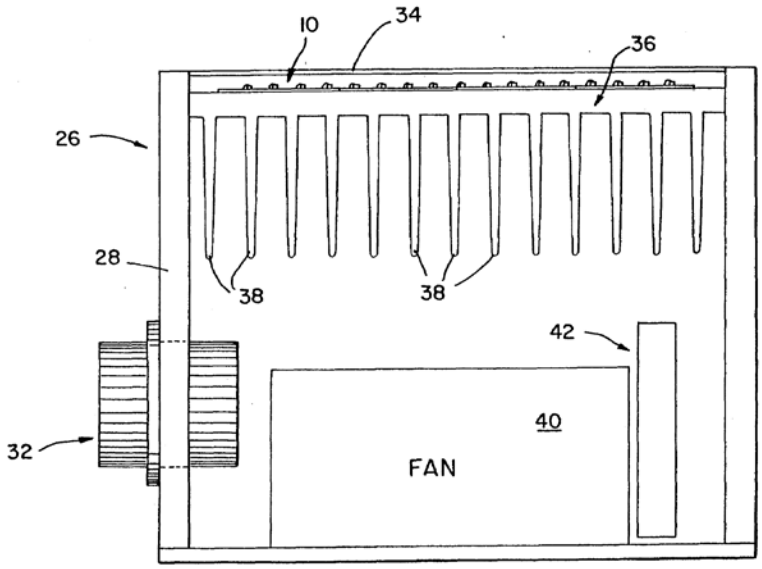


Figure 5 of Ignatius

A0237-38. Figures 4 and 5 of Ignatius depict LED array [10] in a modular unit [26] particularly suitable for enhancing plant growth. Modular units may be

connected in parallel to provide a large scale artificial lighting environment. The modular unit includes a housing [28] to support the LED array, with air vents [30] and a power cord connector [32]. A glass cover plate [34] protects the LED array from the environment. The internal heat sink [36] has fins or vanes [38] to dissipate heat, with an internal fan [40] to pull the heat from the interior of the housing and propel it into the environment. A circuit board [42] contains components of an internal DC power supply, current regulator and override circuit. A0241; *see also* A0240 ("The array is preferably covered with a glass cover to protect it from the environment.").

5. Janssen

The article "Photosynthetic efficiency of Dunaliella tertiolecta under short light/dark cycles," Enzyme & Microbial Tech. 29 (2001) 298-305 ("Janssen") is directed to the photosynthetic efficiency of algae exposed to light/dark fluctuations inside a photobioreactor. A0226. In the Janssen reactor setup, Dunaliella tertiolecta was cultivated in a flat bioreactor with a 1000 ml liquid volume, placed in an aquarium filled with water maintained at a cultivation temperature of 30° C. The front side of the reactor was illuminated with a 20x30 cm panel of LEDs, placed outside the aquarium. A0228.

6. Tazawa

Japanese patent publication no. 10-162609 ("Tazawa") is directed to a lighting apparatus for a water tank, "which increases the decorative effect of the water tank, promotes growth of coral and water plants inside the water tank, and generates little heat." A0197.[3]

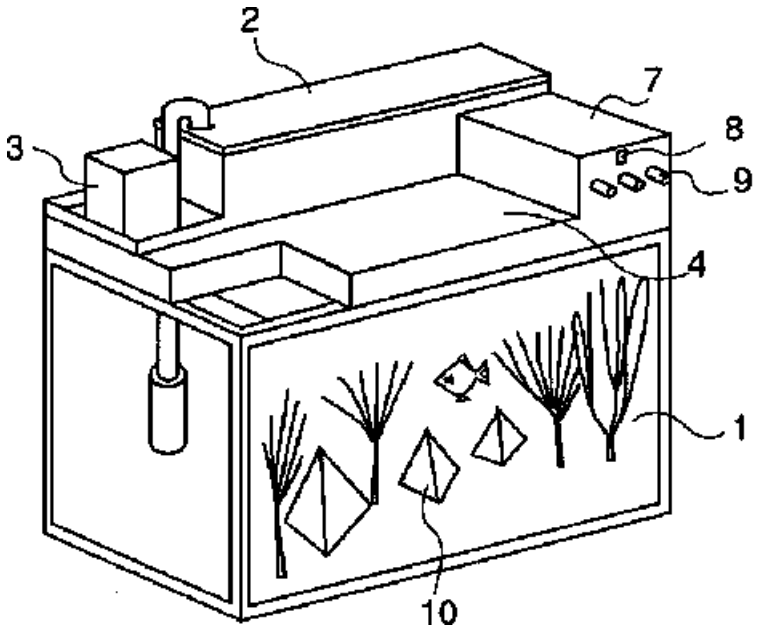


Figure 1 of Tazawa

A0199. Figure 1 shows a water tank, for example at the entrance of a store or hotel lobby. A filter apparatus [2] is arranged at the top of the water tank, with an air pump [3]. A lighting apparatus [4] is also arranged on top of the tank, with a controller [7], switch [8], and dimmer [9]. In addition to molded objects [10], living things such as water plants and coral can be arranged inside the tank as

[3] Citations to Tazawa are to the English translation.

decoration. A0198. The lighting apparatus includes a substrate [5] to support the LED lamps [6] arranged in rows as shown in Figure 2 below, for example, with red, green, and blue LEDs arranged alternatively in rows. A0198.

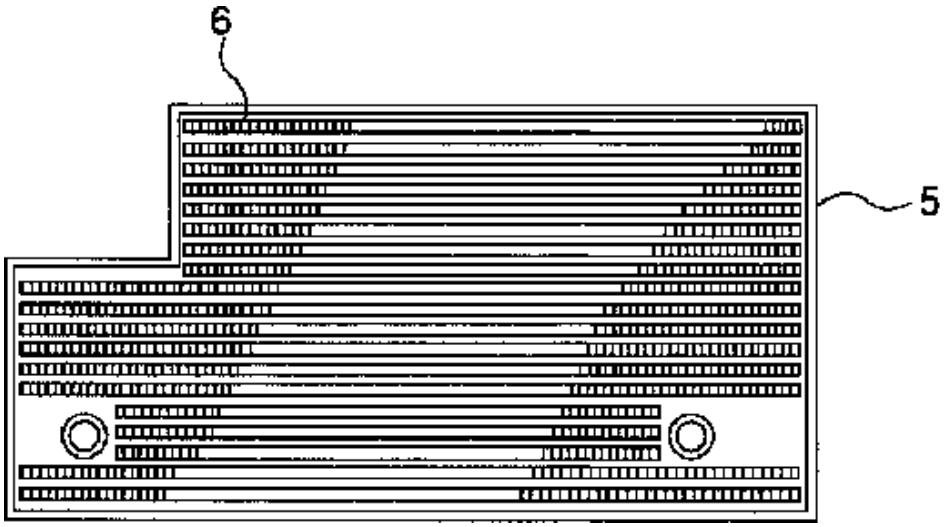


Figure 2 of Tazawa

A0199. When blue LED lamps are lit, an ocean light environment can be reproduced. Changing the proportion of green, blue and red LED lamps in accordance with the colors of the fish, molded objects, and living things inside the tank can increase dramatic effect. Alternatively, a proportion of lamps can be lit that obtain a light quality balance near the photosynthesis curve. A0198-99. There is no mention of any cooling mechanism, or the need for any cooling mechanism, in the Tazawa disclosures.

C. Anonymous Request for *Ex Parte* Reexamination

The Request for *ex parte* reexamination of the '018 patent was filed by an anonymous third party under 37 C.F.R. § 1.510(a). A0103. The Request alleged seven different substantial new questions of patentability, and seven different grounds for rejection, each based on Tomofuji, in various combinations with Kuiper, Ignatius, Lebens, Tazawa, and Janssen. A0107-09.

In the Request Transmittal Form, the Requestor represented that "[a]n English language translation of all necessary and pertinent non-English language patents and/or printed publications is included." A0103. The Information Disclosure Statement indicates that a translation of the Japanese language patent Tazawa was included with the Request; however, only an English language abstract was provided for Tomofuji. A0160-62. Consistent with the IDS, the Requestor relied only on the English abstract and drawings in its proposed rejections and accompanying claim charts. *E.g.*, A0133; A0138; A0247-251.

D. Prosecution of the Reexamination

The Order granting the Request for *ex parte* reexamination states that the substantial new question of patentability (SNQ) finding was based on the five patent publications provided with the Request: Tomofuji, Tazawa, Kuiper, Lebens, and Ignatius. A0288. Although the Order suggests that an "English Translation [of Tomofuji] is provided herewith," *see id.*, the IDS does not indicate

consideration of an English translation (only an English abstract), and no translation of the text was provided.

FOREIGN PATENT DOCUMENTS						
Examiner Initials*	Cite No.[1]	Foreign Patent Document Country Code[3] Number[4] Kind Code[5] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages Or Relevant Figures Appear	T[6]
/kjw/		JP 9308409	12-02-1997	Tomofuji		
/kjw/		WO 91/18970	12-12-1991	Kuiper		
/kjw/		JP H10-162609	06-19-1998	Tazawa		✓

Examiner Signature	/Kenneth J Whittington/	Date Considered	8/30/11

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. [1]Applicant's unique citation designation number (optional). [2]See Kinds Codes of USPTO Patent Documents at www.uspto.gov or MPEP 901.04. [3]Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). [4]For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [5]Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [6]Applicant is to place a check mark here if English language Translation is attached.

A0301-02. With regard to Tomofuji, the Order cites only Tomofuji's drawings in support of the SNQ findings – the examiner relied upon none of the Japanese text. A0291-94. *Compare*, A0292 (Kuiper text cited by line reference), A0293 (Tazawa text cited by paragraph number).

In the first Office Action, the Examiner carried on all of the third-party Requestor's proposed rejections, again citing the Japanese patent publication by Tomofuji, in various combinations with the other references. A0305-30. In general, the Examiner found that Tomofuji disclosed every element of claims 1 and 5, except that it did not teach the use of LEDs in lieu of fluorescent lamps. *E.g.*, A0309-10. The Examiner found that Kuiper taught the use of LEDs in a marine habitat; that Ignatius taught the cooling of LED arrangements; and that Lebens

taught a power supply sufficient to operate and drive LEDs and a controller connected with the supply. A0310-11. With regard to claims 4 and 8, the Examiner found that Janssen taught the particular light intensity capabilities of LEDs, and that it would have been obvious to provide LEDs capable of operating in the recited intensities to promote better aquatic life. *E.g.*, A0315.

Alternatively, the Examiner found that Tazawa disclosed every element of claims 1 and 5, except that Tazawa does not teach any cooling means. *E.g.*, A0323. The Examiner relied on Tomofuji's teaching of a cooling means for fluorescent lights; Ignatius' application of a cooling system to LEDs; Lebens' teaching of a power supply and controller; and Janssen's teaching of the light intensity capabilities of LEDs. *E.g.*, A0323-27.

Again, with respect to Tomofuji, the Examiner did not cite or reference any English translation of the underlying Tomofuji document, or otherwise indicate that a translation had been obtained or relied upon, and no translation of the underlying Japanese text was provided. A0307–08. The Examiner did – for the first time – cite portions of the text of Tomofuji, as opposed to the English abstract and drawings. *E.g.*, A0309 ("See Tomofuji paragraphs 0001-0006, note marine habitat for fish and aquatic plant life").

In its Office Action Response, Orbital traversed the rejections, on the basis that the references did not disclose all of the elements as described in the Office

Action and that the references could be combined in the way suggested by the Examiner only through the use of impermissible hindsight. With regard to Tomofuji, Orbital stated "Patentee notes that the Office Action relies on paragraphs 0001 to 0006 for rejections and no translation of these paragraphs has been made available." A0342. Orbital then proceeded to discuss Tomofuji based on the English language abstract and drawings that had previously been provided. A0342-43.

The Examiner subsequently issued a Final Office Action, continuing the rejections outlined in the first. A0376-414. The Examiner did not address Orbital's objection that, given the Examiner's reliance on Tomofuji text, it had not been provided with a translation of "all necessary and pertinent non-English language patents," as required.[4] No Tomofuji translation was made part of the file wrapper during reexamination.

E. Orbital's PTAB Appeal And The Examiner's Machine Translation of Tomofuji

Orbital appealed to the Patent Trial and Appeal Board on the grounds that there was no prima facie case of obviousness, and the claims were patentable over the prior art of record. A0738–39. Orbital also argued that the rejections were

[4] Orbital submitted an additional Response; however, the Office refused to enter the proposed amendment and additional evidence submitted with the Response. A0687-88.

improper if the Examiner was relying on a translation of the underlying Japanese text of the Tomofuji reference, when no translation was provided in the third-party Request, cited in the rejections, or put on record during prosecution. A0755–59.

An interview was held after Orbital submitted its Appeal Brief, before the Examiner's Answer. A0818–22. In the interview, Orbital maintained the right to appeal on the issue of patentability, as well as the propriety of the rejections based on lack of a translation. A0822. Orbital also stipulated that – assuming proper procedures were followed – the Patent Office had discretion to reopen prosecution, but Orbital maintained that providing a translation of the Tomofuji reference in the Examiner's Answer, in connection with the appeal, was not an appropriate remedy to all the issues on appeal. A0821.

Prosecution was not reopened. Instead, the Examiner appended a machine translation of the Tomofuji reference to the Answer, arguing "since this is the first instance of the issue, making this translation of record at this time overcomes [Orbital's] objection." A0834. The Answer also disclosed for the first time that – despite the initialed record showing only the English abstract of Tomofuji had been considered – a machine translation of the Tomofuji reference had actually been obtained prior to opening the reexamination and had been used to confirm the facts of the Order granting reexamination, and the rejections of Orbital's claims. A0834–36. The English abstract – the only Tomofuji document actually submitted

with the Request, provided to Orbital, or cited in the SNQ determination – apparently had not been relied upon at all. A0835 ("It is Examiners' further position that since Examiners have not relied upon the abstract of Tomofuji in any manner, the rejections are not inappropriate under MPEP § 706.02(II).").

The Tomofuji machine translation relied upon by the Examiner contains a Notice that "[t]his document has been translated by computer. So the translation may not reflect the original precisely." The translation also indicates that "****" "shows the word which can not be translated." The translation carries a further disclaimer noting that the Japan Patent Office and translation service "are not responsible for any damages caused by the use of this translation." A0898. In addition to containing numerous untranslatable words and phrases, the translation fails to follow many English conventions regarding grammar or sentence structure. A0892-902. For example:

> [0003] On the other hand, these days, it not only uses a tank only for breeding of mere aquarium fish, but, The tendency to utilize the use as a room interior design is increasing, and using for propagation of various kinds of aquatic plants, etc. broadly etc. therefore, the light for tanks, Rather than the light currently used for the conventional tank for aquarium fish, the number of a fluorescent lamp is increased and a thing bright [one layer of reliances] has come to be called for.

A0898.

> [0016] The internal circumference edge 20a of a size where the insertion hole 20 established at some light coverings 3 drops and puts the periphery edge of the air discharge board 21 of the fan motor upper part in the cooling system of this working example, **** 20b

> which supports the periphery edge of the air discharge board 21 attached around this internal circumference edge 20a bottom, Consist of the notch 23 provided in the predetermined interval position of this **** 20b, and said air discharge board 21 has the knob part 25 or the coin insertion groove 35 for rotatably operating in the center section, and. The periphery rear face of the air discharge board 21 is equipped with the **** notch 23 of said insertion hole 20, and the lock protruding piece 26 of the shape of ******** which fits in.

A0900-901.

Perhaps because of the poor quality translation, the Examiner's discussion of Tomofuji in the Final Office Action rejections does not even match the machine translation upon which the Examiner allegedly relied. The rejections all rely on Tomofuji for teaching a "housing" (citing reference 2) and a "light source" (citing reference 4). A0378–79; A0385–86; A0392–93. The machine translation, however, states that "2 is a light," and "two or more fluorescent lamps 4 were arranged in the covering 3." A0900. The only structure in Tomofuji that might correspond to the housing claimed in the '018 patent is Tomofuji's "covering 3," and Tomofuji's covering 3 is not mentioned in the rejections at all. *See* A0378–79; A0385–86; A0392–93.

The Board affirmed the Office's reexamination Order. A0018-43. First, the Board found that – despite raising the issue in its Response to the first Office Action and despite having no notice that the Examiner had relied upon a translation – Orbital had waived any objection based on the translation issue. Second, the Board found that neither the Requestor nor the Examiner were required to provide

a translation of Tomofuji, or even to notify Orbital that the Examiner had obtained and relied upon a translation for its rejections. A0023 ("The applicable statute, 35 U.S.C. § 303(a), does not require a translation to be cited or supplied . . . The translation is merely evidence of what the patent discloses and does not alter the citation of the patent.") Finally, the Board affirmed the Examiner's finding that the combinations of prior art cited in the rejections rendered obvious claims 1-8 of the '018 patent. The Board denied Orbital's request for rehearing, *see* A0002-16, and Orbital timely appealed.

SUMMARY OF THE ARGUMENT

The anonymous third party request for *ex parte* reexamination is a powerful weapon, and should be carefully regulated. While promoting the public interest in maintaining patent quality is a laudable goal, the reexamination statutes and regulations must also be read to protect legitimate patent holders from harassment and to avoid the tremendous costs to the Office of prosecuting unreasonable requests for reexamination. Thus, the statutes and regulations provide minimum requirements that a Requestor must satisfy before the Office will assign a filing date; rules that an Examiner must follow to afford the patent holder a fair opportunity to respond during prosecution of a reexamination; and legal standards for obviousness designed to prevent hindsight reconstruction of an invention using the prior art.

Those statutes, regulations, rules, and legal standards were ignored multiple times in the conduct of the reexamination of the '018 patent. The net result was a woefully unclear and incomplete record and an unfair deprivation of Orbital's right to respond effectively to the Examiner's rejections.

First, by failing to provide an English language translation of a primary prior art reference, Tomofuji, the Requestor did not satisfy the requirements of 37 C.F.R. § 1.510(b). As a result, the Office erred when it granted the reexamination request a filing date. *See* 37 C.F.R. § 1.510(c), (d); MPEP § 2227.

Second, having failed to vacate the filing date, and having informed Orbital through the IDS that no English translation of Tomofuji was considered, the Examiner should have provided Orbital with any translation he relied upon as evidence of Tomofuji's disclosures. At a minimum, the Examiner should have notified Orbital that he had obtained and was relying on a translation. The Examiner's failure to do so violated the requirement that the Examiner provide a clear record and a clear description of the pertinence and manner in which a reference supported the rejection and deprived Orbital of a fair opportunity to respond to the rejections. *See* 37 C.F.R. § 1.104(c)(2); MPEP §§ 706.02(II), 2143.

Third, the Examiner erred when he relied on a machine translation of Tomofuji which warns, on its face, that it "may not reflect the original precisely" and disclaims any responsibility for damage arising from use of the translation.

Key portions of the translation contain words that could not be translated or are otherwise incomprehensible. The Board should have held that the translation could not constitute substantial evidence of Tomofuji's content sufficient to support a finding of obviousness. *See Ex Parte Rudd*, No. 2007-3775 (PTAB June 25, 2008), A1038-43.

Fourth, the Board erred when it found that Orbital had waived its objections based on the unreliable content and procedural errors surrounding the Tomofuji translation. The plain language of the *SNQ Clarification*, Fed. Reg. Vol. 75, No. 122 (June 25, 2010), applies only to objections to the "SNQ determination," and does not require a patent holder to request reconsideration of procedural issues (particularly those which the patent holder did not appreciate as an issue at the time). Further, when the Examiner for the first time cited to the text of Tomofuji, rather than simply the English abstract or drawings, Orbital raised the issue of the lack of translation in response. A0342. The Examiner responded by issuing a Final Office Action.

Finally, substantial evidence does not support the Examiner's prima facie case of obviousness. As described above, the only evidence of the content of Tomofuji – on which every rejection relies – is an unreliable and in some instances incomprehensible machine translation. Even accepting the machine translation, Tomofuji teaches a mounting configuration that is materially different from that

claimed in the ‘018 patent; the prior art as a whole leads away from the need to cool an LED light source of the kind claimed in the Orbital patent, and there is an insufficient basis on which to find a motivation to combine the cited references.

Accordingly, the Board’s decision should be reversed, and the ‘018 patent claims should be upheld. Alternatively, the Court should remand the case for further prosecution, ordering the Office to issue a Decision Vacating Filing Date, and requiring the anonymous third party Requestor to comply with all filing requirements by providing a translation of Tomofuji. At a minimum, the Court should remand the case and order the Office to obtain and provide to Orbital a competent translation of Tomofuji and, in the event the Office maintains the rejections, to clearly articulate its reasoning in a non-final Office Action.

ARGUMENT

I. STANDARD OF REVIEW

Statutory interpretation is a question of law, reviewed *de novo*. *In re Kathawala*, 9 F.3d 942, 945 (Fed. Cir. 1993) (“the plain and unambiguous meaning of a statute prevails in the absence of clearly expressed legislative intent to the contrary”); *In re Donaldson Co.*, 16 F.3d 1189, 1192–93 (Fed. Cir. 1994) (en banc). Substantial deference is afforded to the Patent Office’s interpretation of its own regulations, unless plainly erroneous or inconsistent with the regulation in situations of ambiguity. *In re Lovin*, 652 F.3d 1349, 1353 (Fed. Cir. 2011).

Obviousness under 35 U.S.C. § 103(a) is a question of law,[5] based on underlying findings of fact. *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966); *In re Baxter*, 678 F.3d at 1361. Differences between the claimed invention and the prior art, and what a reference actually teaches, are questions of fact. *Id.*; *Rapoport v. Dement*, 254 F.3d 1053, 1060–61 (Fed. Cir. 2001). The Board's legal determinations are reviewed *de novo*, and its factual findings for substantial evidence. *In re Baxter Int'l, Inc.*, 678 F.3d 1357, 1361 (Fed. Cir. 2012).

II. THE EXAMINER'S FAILURE TO PROVIDE A COMPETENT TRANSLATION OF TOMOFUJI DURING REEXAMINATION JUSTIFIES REVERSAL OF THE BOARD'S DECISION

The series of errors committed first by the Requestor, and then by the Examiner, with respect to the primary prior art reference relied on by the Examiner in invalidating Orbital's '018 patent claims made it impossible for Orbital to receive fair consideration of its claims on reexamination. Orbital therefore respectfully requests that the Court reverse the Board's decision.

A. The Office Erred When It Proceeded With Reexamination Despite The Requestor's Failure To Satisfy The Minimum Request Requirements

The plain language of 35 U.S.C. § 302 sets a minimum bar for access to the reexamination process. The Patent Office has added further constraints when the

[5] The '018 patent was filed before March 16, 2013, and pre-AIA 35 U.S.C § 103(a) applies. Leahy-Smith America Invents Act, Pub. L. No. 112-29, § 3(c), 125 Stat. 284, 293 (2011).

Request relies on foreign language references under 37 C.F.R. § 1.510. Thus, any request for reexamination under 35 U.S.C. § 302 must include (1) a statement pointing out each substantial new question of patentability based on prior patents and printed publications, and (2) a detailed explanation of the pertinence and manner of applying the cited prior art to every claim for which reexamination is requested. 37 C.F.R. § 1.510(b). In addition, the request must include (3) "A copy of every patent or printed publication relied upon or referred to in paragraph (b)(1) and (2), accompanied by an English language translation of all the necessary and pertinent parts of any non-English language patent or printed publication." *Id.*

There is no question that the anonymous third party Requestor did not satisfy the requirements of 37 C.F.R. § 1.510(b). The Requestor indicated in its cover sheet that it had provided a translation of all "necessary and pertinent" parts of foreign patent documents. A0103. With regard to Tazawa, the Requestor submitted a full English translation and indicated as much on its IDS. With regard to Tomofuji, however, the Requestor submitted only the English abstract, indicating no translation of the text on its IDS. A0160. Thus, the anonymous third party Requestor failed to meet the minimum requirements for requesting reexamination of the '018 patent under 37 C.F.R. § 1.510(b).

As a result, the reexamination should not have been granted a filing date:

> (c) If the request does not . . . meet all the requirements by paragraph (b) of this section, then the person identified as requesting

> reexamination will be so notified and will generally be given an opportunity to complete the request within a specified time. Failure to comply with the notice will result in the *ex parte* reexamination request not being granted a filing date . . . .
>
> (d) The filing date of the request for *ex parte* reexamination is the date on which the request satisfies all the requirements of this section.

37 C.F.R. § 1.510(c), (d). *See also* MPEP § 2227 ("It is to be noted that a single failure to comply with the 'Notice of Failure to Comply with *Ex Parte* Reexamination Request Filing Requirements' ordinarily will result in the reexamination request not being granted a filing date."). If the Examiner did not discover the non-compliance until after the control number and filing date had been assigned, the Office should have issued a Decision Vacating Filing Date. *See* MPEP § 2227. The Office erred when it allowed the reexamination to proceed without requiring the Requestor to satisfy the statutory and regulatory requirements.

The error was not harmless. As discussed more fully below, Orbital *never* received the translation to which it was entitled during the reexamination process, and the translation was not made part of the file wrapper. The error was compounded when the Requestor and Examiner provided Orbital with an IDS indicating that no translation of Tomofuji was considered. At no point in the reexamination was Orbital clearly informed that the Examiner was consulting a translation – much less an incomplete and in some instances incomprehensible

machine translation – to determine the teachings of the key prior art reference at issue in the reexamination. By withholding a translation that was necessary and pertinent to each and every one of the proposed rejections, the anonymous third party virtually guaranteed that the basis for the reexamination and subsequent rejections would not be clear. Had Orbital been apprised of the translation before the Examiner issued a Final Office Action, Orbital may have modified its arguments, obtained a more reliable translation of Tomofuji, or amended its claims. The Office's failure to follow its own regulations deprived Orbital of the opportunity to respond appropriately.

Accordingly, the Examiner committed error by proceeding with the reexamination based on a Request that did not meet the minimum statutory and regulatory standards. The appropriate remedy for the error is reversal of the decision and remand to the Office, to allow it to issue a Decision Vacating Filing Date.

B. The Office Erred When It Relied Upon A Translation Of Tomofuji, Without Providing A Copy Of The Translation Or Notice Of The Reliance To Orbital

The third party Requestor's error was compounded by the Examiner's subsequent failure to provide Orbital with the translation upon which he relied or, at a minimum, to notify Orbital that the Examiner was relying on such a translation. A patent owner is entitled to a clear record as to whether the examiner

is relying upon the abstract or the underlying full text document to support a rejection. MPEP § 706.02(II). Further, the patent owner is entitled to a clear description of the pertinence and manner in which each cited reference is used by the examiner to support a rejection. *See* 37 C.F.R. § 1.104(c)(2); MPEP § 2143(I)(A).

Here, the Examiner obtained and relied upon the translation, while at the same time communicating to Orbital through the IDS that he was relying only on the English abstract. Under such circumstances, the Examiner is required to provide the translation relied upon, or at a minimum to provide a new IDS or some other document clearly indicating reliance on the translation. By failing to do so, the Examiner deprived Orbital of a "clear record as to whether the examiner is relying on the abstract or the underlying full text document to support a rejection," as well as a clear description of the pertinence and manner in which each cited reference was used by the examiner to support each rejection.

In rejecting Orbital's appeal, the Board stated that the Examiner had no duty to cite or supply the translation, noting the absence of an express requirement in 35 U.S.C. § 303(a) that an examiner do so. A0023. While the statute itself is silent on the issue, surely the Examiner is not allowed to tell the patent owner in one communication – here, the IDS – that he did not rely on a translation, while at the same time obtaining and relying on a translation to support rejections. Such a

reading of the statute would violate a basic premise of the examination process – that the patent owner is entitled to a clear description of the manner in which each cited reference supports a rejection. In the context of patent examination, an examiner who initially relies on an abstract, and later obtains the full document and translation, is instructed to supply the patent applicant with "the full text document and a translation (if not in English) . . . in the next Office action." MPEP § 706.02(II). There should be no distinction in this regard between initial examination and reexamination.

C. The Machine Translation of Tomofuji Cannot Support The Examiner's Finding Of Obviousness

All seven rejections rely on Tomofuji as a primary prior art reference. However, even if the Examiner had provided Orbital with the translation during prosecution, the machine translation of Tomofuji cannot support the Examiner's finding of obviousness, because the translation is not reliable evidence of the Tomofuji disclosures:

- The face of the document warns that the translation "may not reflect the original precisely."
- The translation contains a disclaimer that the JPO and translation service "are not responsible for any damages caused by the use of this translation."
- Words that could not be translated are replaced with asterisks (****).

- The translation appears to be a literal translation into English from Japanese, resulting in a document with numerous errors, some rendering entire passages incomprehensible.

A0892-902.[6]

In a similar case, the Board criticized the Examiner for his rejection of patent claims based on a machine translation of a Japanese patent, which contained warnings that it "may contain errors," and that the JPO and drafters "are not responsible for the result" of the translation; included "[u]ntranslatable words [] replaced with asterisks"; and was "replete with grammatical and idiomatic errors," rendering parts of the machine translation "unintelligible to us." *See Ex parte Rudd,* No. 2007-3775 at 2-3 (PTAB June 25, 2008), A1039-40. In *Rudd*, the Board remanded and directed the Examiner to "consult the translators in the Translations Branch of the Scientific and Technical Information Center," and obtain written translations into English. *Id.* at 5, A1042. On remand, the Examiner rejected the claims again, but the Board reversed, finding that the claims were patentable over full text, non-machine, reliable translations of the underlying Japanese-language references. *See Ex Parte Rudd,* No. 2008-006250 at 4-5 (PTAB July 15, 2009) A1044-49.

[6] Compare the machine translation of Tomofuji with the Tazawa translation, which is reasonably intelligible, idiomatic and grammatical, and does not have untranslated words, or a disclaimer. *See* A0197–200.

In this case, Orbital disputes that Tomofuji teaches a cooling system that would have any effect on an LED light engine, if Tomofuji's fluorescent lights were replaced with LEDs as the Examiner suggests. To understand how the Tomofuji airflow and mounting configuration actually differ from the '018 patent, Orbital referred to the corresponding description of these additional structures in the machine translation. In particular:

> The periphery rear face of the air discharge board 21 is equipped with the **** notch 23 of said insertion hole 20, and the lock protruding piece 26 of the shape of ******* which fits in.

Also:

> It holds to the angular position which the lock protruding piece 26 of the shape of ****** which made the periphery rear face of the air discharge board 21 project can insert in in the notch 23 of insertion hole **** 20b corresponding, respectively[.]"

A0900–01. Unfortunately, because of the numerous untranslatable words, these portions of the machine translation do not clearly describe the scope and content of the prior art, or allow a reader to ascertain the differences between the prior art and the invention, in a way that would show whether a person of ordinary skill might have thought the claims would have been obvious under 35 U.S.C. § 103. *See, e.g.*, *Graham*, 383 U.S. 1 at 17 ("Under 103, the scope and content of the prior art are to be determined; differences between the prior art and the claims at issue are to be ascertained; and the level of ordinary skill in the pertinent art resolved.").

Had the Examiner provided the translation to Orbital during prosecution of the reexamination, Orbital could have objected to the translation at that time, or at least had the opportunity to obtain its own competent translation to be entered in the record, before the close of prosecution. As it stands, however, the machine translation does not clearly define the scope of the Tomofuji reference, or allow the differences between Tomofuji and the claims to be ascertained. The Board should thus be reversed, and the claims should be allowed, or remanded for the Examiner to obtain a written English translation of the Tomofuji reference from the Translations Branch.

D. Orbital Did Not Waive Its Objections To The Translation Issues

At the Examiner's urging, the Board found that Orbital had waived any objection to the conduct of the reexamination on two bases. First, the Board found that Orbital was required to request reconsideration of the SNQ determination, based on the *SNQ Clarification* (*Clarification of the Procedure for Seeking Review of a Finding of Substantial New Question of Patentability in Ex Parte Reexamination Proceedings*, Fed. Reg. Vol. 75, No. 122 (June 25, 2010)). A0024. Second, the Board found that Orbital had not requested a translation from the Examiner during the reexamination, and therefore, the Examiner's provision of the translation with its Answer on appeal cured any error that may have occurred below. Neither argument has merit.

Orbital did not waive its objection to the Requestor's failure or the Examiner's actions by failing to request reconsideration. This is not an issue regarding the *sufficiency* of the SNQ, which may have required Orbital to request reconsideration before the Examiner as provided in the *SNQ Clarification*. The *SNQ Clarification* addresses preservation of rights only with regard to the "SNQ determination." It does not address every procedural impropriety that could arise regarding the Request, and more specifically, it does not address the Office's obligation to ensure that the Request meets the minimum standards to be assigned a filing date.

Nor should Orbital be deemed to have waived its objections by failing to request a translation during prosecution. The Requestor represented that it had provided all "necessary and pertinent" English translations. The Requestor's IDS indicated that it had included a translation of Tazawa, but only an English language abstract for Tomofuji. The Requestor did not cite to any of the text of the Tomofuji patent. Similarly, the Examiner initialed the IDS, indicating that Tomofuji had been considered without a translation, and cited only the English abstract and the drawings in the SNQ. Those facts led Orbital to the reasonable conclusion that all of the "necessary and pertinent parts" of Tomofuji were found in the abstract, or perhaps in the drawings. It was also reasonable for Orbital to assume that, if the Examiner later obtained (or, in this case, had already obtained) a

translation, the translation would be provided to Orbital in the next Office Action. *See* TMEP § 706.02 (II) (While it may be appropriate for an examiner to make a rejection in a non-final Office action based in whole or in part on the abstract of a foreign language document, "[i]n such circumstances, the full text document and a translation (if not in English) may be supplied in the next Office action.").

In addition, the Board and the Examiner are simply incorrect when they state that Orbital never raised the translation issue during reexamination. Although it was not entirely clear that, contrary to the IDS, the Examiner had relied on a translation, Orbital noted the absence in its Response to the first Office Action. A0342 ("Patentee notes that the Office Action relies on paragraphs 0001 to 0006 for rejections and no translation of these paragraphs has been made available."). In response, the Examiner issued a Final Office Action, still failing to supply his translation and ignoring Orbital's statement.

If, as the Board and Examiner apparently believe, a patent owner is required to request from the Examiner a translation of every foreign language document – regardless of whether the Requestor or Examiner appear to have relied on the document – then the rules should make clear that such a burden falls to the patent owner. Until such point, it would be unjust to find that Orbital waived its objection to a translation that it did not know existed, that was never made of record in the

reexamination proceeding, and was not provided to Orbital until after prosecution had closed and Orbital filed its appeal brief.

III. THERE IS NO PRIMA FACIE CASE OF OBVIOUSNESS, AND THE BOARD SHOULD BE REVERSED

To support a rejection of a patent claim under 35 U.S.C. 103, there must be a clear articulation of the reasons why the claimed invention would have been obvious. *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 538, 418 (2007). The Office bears the initial burden of establishing a prima facie case, by showing that the prior art would appear to have suggested the claimed subject matter, to a person of ordinary skill in the art. *In re Rinehart*, 531 F.2d 1048, 1052 (CCPA 1976). If this burden is not met, Orbital is not obligated to submit evidence or argument of patentability. See *In re Rijckaert*, 9 F.3d 1531, 1532 (Fed. Cir. 1993) ("Only if that burden [of establishing a prima facie case] is met, does the burden of coming forward with evidence or argument shift to the applicant."). *See also* MPEP § 2142 ("Legal Concept of Prima Facie Obviousness").

This burden was not met by the Office during prosecution of the '018 patent reexamination, and each and every one of Orbital's claims 1–8 should be allowed over the prior art.

A. All Of The Proposed Rejections Of Orbital's Claims Rely On The Same Structure And Do Not Reproduce The Claimed LED Light Mounting Configuration

In both initial Office Action and the Final Rejection of Orbital's claims, the Examiner carried over proposed rejections 1, 3, and 5 from the original third-party Request for *ex parte* reexamination, as directed to independent claims 1 and 5 of the '018 patent.[7] These rejections are based on Tomofuji in view of Kuiper, Lebens and Ignatius; Kuiper in view of Tomofuji, Lebens and Ignatius; and Tazawa in view of Tomofuji, Lebens and Ignatius, respectively. A0306; A0378. All of these different combinations result in the same structure; however, none reproduces the actual configuration of the invention as claimed.

The order of references in the first two combinations is slightly different, but the Board did not deem that this creates an important distinction. *Compare, e.g.*, A0380 ("…incorporate the LED lighting arrangements of Kuiper in the marine light system of Tomofuji") *to* A0386 ("…such that the LEDs of Kuiper are placed in the housing taught by Tomofuji"); *see also* A0960 n. 2 ("the order is not deemed to create an important distinction here") (*citing In re Mouttet*, 686 F.3d 1322 (Fed. Cir. 2012)). Tazawa, the first-listed reference in rejection 5, does not teach cooling, nor does Tazawa expressly distinguish the housing from the lighting

[7] Rejections 2, 4, 6, and 7 are directed solely to dependent claims, which would necessarily survive if dependent claims 1 and 5 survive.

apparatus itself. *See* A0768; A0197–200. For this feature, the Examiner again relies on Tomofuji, using the same housing, light source mount, and cooling system configuration applied to the other two rejections of Orbital's claims. A0392–93.

On appeal, the Board maintained the Examiner's position, stating that "Tomofuji discloses a similar light housing and aquarium as discussed supra," and "[s]uch a housing and light combination would have been obvious to hold lights above an aquarium to promote growth and visibility." A0982. Thus, the rejection on record based on the Tazawa reference actually relies on the very same Tomofuji fluorescent light mount and cooling system configuration that was applied to the other rejections, and for the reasons stated below, this configuration does not reproduce Orbital's invention as claimed.

Regardless of the order and selection of individual references, the final rejections of Orbital's claims all rely on Tomofuji for teaching reference 2 as "a housing," and reference 4 as "a light source." A0378–79; A0385–86; A0392–93. The machine translation provided with the Examiner's Answer, however, states that "2 is a light," and "two or more fluorescent lamps 4 were arranged in the covering 3." A0900. Thus, neither the rejections nor the translation are clear as to what is the light and what is the housing, and nothing in the rejections shows how either option would have resulted in an "an LED light source mounted to the inner

side of said housing," as recited in Orbital's claims. To the contrary, the only structure in Tomofuji that might correspond to the claimed housing is Tomofuji's "covering 3," and Tomofuji's covering 3 is not mentioned in the rejections at all. *See* A0378–79; A0385–86; A0392–93.

The actual basis for the rejections was not articulated until the Board's Decision on Appeal, in response to Orbital again raising the issue of the machine translation. The Board stated that "the 'light' 2 simply includes the housing cover 3 and the lamps 4 therein such that the Examiner's reference to the light 2 as a housing reasonably apprises Orbital of the basis for the claim rejections." A0970. When Orbital argued that it was still material to know whether the Examiner was relying on Tomofuji's reference 2 as a light or a housing, because the claims recite a specific relationship between these two elements, the Board replied that "This argument exalts form over substance," and "Regardless of the particular numeral cited, Tomofuji's Figures 1–3 plainly show a housing within which reside lamps 4, corresponding to the claimed position of a 'light source mounted to the inner side of said housing.'" A1021.

While the Office and the Board are certainly required to meet the "form" requirements (by clearly articulating the basis for any rejections), Orbital's argument is firmly grounded in substance. Even accepting the Board's explanation, Tomofuji's fluorescent lights 4 still do not correspond to the claimed

position, "mounted to the inner side of said housing," as recited in claims 1 and 5 of the '018 patent. Instead, Tomofuji's fluorescent lamps 4 are mounted to light reflector 7, as clearly shown in Figures 1–3 of Tomofuji, and this is different in both form *and* substance from the claimed structure. *See also* A0896–97; A0900.

More particularly, Tomofuji teaches that "operation switch room" 10 and "fan motor 14" are mounted to the claimed inner side of the housing, opposite the outer side and facing the open top of the marine environment, but neither of these structures is "an LED light source [or any light source] comprising at least one light engine having a plurality of individual LEDs capable of providing light at a wavelength from about 380 nm to about 690 nm," as recited in the '018 patent claims. Conversely, if an LED light source were used in place of Tomofuji's fluorescent bulbs 4, as suggested by the Board, the LED light source would be mounted to Tomofuji's light reflector 7, as shown in Figures 1–3, and this is not the same as being mounted to the inner side of a housing, opposite the outer side and facing the open top of a marine habitat, as specified in each and every one of Orbital's claims.

In short, the articulated rejections all depend on the replacement of Tomofuji's fluorescent lamps with LEDs; however, there is no substantial evidence that Tomofuji's fluorescent lamps 4 correspond to the position of the LED light source as claimed in the '018 patent.

B. The Difference Between The Claimed Invention And The Prior Art Is Substantial

The differences between the claimed mounting configuration and the Tomofuji reference are important for cooling and thermal management. As shown in Figures 1 and 2 of the '018 patent (A1026–27), an LED light source mounted on the inner side of the housing provides a direct thermal path to the outer side, which is adjacent the inner side as described in claims 1 and 5. Heat can thus dissipate from outside the housing, saving energy and reducing the thermal load. *See* A1031. This is similar to underwater embodiments of the invention, because the cooling also occurs via conduction, except that heat dissipation in the claimed configuration occurs over the greater surface area of the outer side of the housing. *See, e.g.*, A1032.

Tomofuji, by contrast, shows a light mounted to reflector 7, separated from the inner side of covering 3 by an air space, which is in fact a good insulator. The Tomofuji system is also designed to generate airflow over fluorescent *bulbs* 4, because these are the heat source, but this configuration would have substantially no effect on an LED light engine, because the heat is not generated by the LED bulbs themselves. In other words, airflow over the LED bulbs would have little to no cooling effect, and there is nothing in the Tomofuji cooling system showing how to dissipate heat generated by the driver electronics, including current drivers,

light engine selection switches, and other electronic components that are not even present in Tomofuji's traditional fluorescent lighting system. *See* A1032; A1034.

Because neither the third-party Request nor the ensuing Office Actions articulate how these difference could have been overcome by a person of ordinary skill, on appeal, Orbital was forced to rely on the machine translation of the Tomofuji specification itself to argue the differences between the claimed invention and the prior art; however, the machine translation presents numerous difficulties in this regard. Based on the machine translation, for example, reference 6 between light reflector 7 and the inner side of cover 3 is described as a "top power distribution part," but this in fact appears to be an air space, as described above. A0900. Similarly, to understand how the Tomofuji airflow and mounting configuration actually differ from '018 patent, Orbital turned to the corresponding description of these additional structures in the machine translation. In particular:

> The periphery rear face of the air discharge board 21 is equipped with the **** notch 23 of said insertion hole 20, and the lock protruding piece 26 of the shape of ******* which fits in.

Also:

> It holds to the angular position which the lock protruding piece 26 of the shape of ****** which made the periphery rear face of the air discharge board 21 project can insert in in the notch 23 of insertion hole **** 20b corresponding, respectively[.]"

A0900–01. The Examiner cannot possibly support a prima facie case of obviousness based on such disclosures, or adequately explain how the Tomofuji

cooling system, configured as described by Tomofuji, would result in the claimed '018 patent invention.

C. Where The References Lead Away From The Proposed Reconstruction Of The Invention As Claimed, There Is No Burden On Orbital To Show That The Prior Art Would Never Use The Claimed Cooling System

The Tomofuji reference is directed to cooling a fluorescent light system, which is a very different problem from cooling an LED light engine, as described in the '018 patent. As best as can be discerned from the Tomofuji machine translation, the problem was to design a cooling device so that even if the temperature rises abnormally high, heated air is forceably exhausted from the aquarium cover "to prevent illuminator damage and/or fire accident," or "the problem of becoming a generation cause of fire." A0892; A0898. Kuiper, by contrast, teaches that LEDs "save an enormous amount of energy, in comparison with normal sources of artificial light," which "convert a large part of the energy supplied to them into heat." A0187. Similarly, Tazawa teaches an LED lighting system that "generates little heat." A0198.

Whatever else the Tomofuji machine translation may teach, "generates little heat" and "save enormous amounts of energy," as taught by Kuiper and Tazawa, would not lead a person of ordinary skill toward any obvious need for cooling an LED light source in order to prevent fire accident, as described by Tomofuji. In reply, the Examiner argues: "There is no basis to assume (as Appellant does

herein) that simply because Kuiper notes that LEDs produce less heat then it would never use a cooling system." A0853.

This presents a situation similar to the one in *In re Giannelli*, where the Board maintained a rejection because the applicant was unable to show that a chest-press machine could not be used to perform the claimed rowing exercise. *In re Giannelli*, 739 F.3d 1375, 1379 (Fed. Cir. 2014). As noted by the Court in reversing the decision, the test for obviousness is not physical capability alone, and like the applicant in *Giannelli*, Orbital is under no obligation to provide evidence that Kuiper and Tazawa "would never use a cooling system," until it is first explained why a person of ordinary skill in the art would obviously have modified either of these references to include cooling in the first place. *See id.* at 1380 ("because the initial burden was not met, Giannelli was not obligated to submit additional evidence to rebut the examiner's findings") (citing *In re Rijckaert*, 9 F.3d at 1532).

For cooling, the Board also turns to Ignatius, but Ignatius teaches a high voltage (+180 volt) LED array that is "preferably covered with a glass cover to protect it from the environment." A0240.[8] This contrasts with the much lower voltage (+24 volt DC) LED light engine of the '018 patent, which is specifically

[8] Ignatius is not relied upon for structure, only for the teaching that "it is well known to use a cooling system in housings for LEDs." A0857.

designed to improve safety in open-top marine applications, with less heat dissipation. A1032.

The Board affirmed the Examiner's argument that "Ignatius and Kuiper both suggest that the LED strip or panel easily could have been employed in place [of] the fluorescent lamps of Tomofuji." A0979–80. But the fact that something is merely capable or "easily could have been employed" does not make it obvious under 35 U.S.C. § 103(a), if the prior art indicates that it might not have been such a good idea in the first place. *See In re Giannelli*, 739 F.3d at 1380 ("Physical capability alone does not render obvious that which is contraindicated.").

All of the Board and Examiner's arguments have the same intent, which is to show obviousness by arguing that Orbital cannot prove the proposed configurations would not work. But the Kuiper and Tazawa teachings to "generate[s] little heat" and "save enormous amounts of energy" do not obviously lead to cooling, and where Ignatius is the only other reference that includes this feature, the fact that Ignatius utilizes a +180 volt, high intensity LED that should preferably be protected from the environment would not be lost on a person of ordinary skill, interested in open-top salt water aquarium applications. Absent substantial evidence in the record to show why a person of ordinary skill would obviously have ignored all of these teachings in order to reproduce the claimed invention nonetheless, there is no prima facie case of obviousness, and the Board

should be reversed. *See also, e.g.*, *Ex Parte Giannelli*, No. 2013-1167 at 9 ("…a sure-fire way to cause injury is to use a machine in a manner not intended by the manufacturer").

CONCLUSION

The Office committed multiple procedural and substantive errors which should have been reversed by the Board. Accordingly, Orbital respectfully requests that the Court reverse the Board's decision and uphold the '018 patent claims. Alternatively, the Court should remand the case for further prosecution, ordering the Office to issue a Decision Vacating Filing Date, and requiring the anonymous third party Requestor to comply with all filing requirements by providing a translation of Tomofuji. At a minimum, the Court should remand the case and order the Office to obtain and provide to Orbital a competent translation of Tomofuji and – in the event the Office maintains the rejections – to clearly articulate its reasoning in a non-final Office Action.

Respectfully submitted,

DORSEY & WHITNEY LLP

Dated: April 21, 2014

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CERTIFICATE OF SERVICE

I hereby certify that on April 21, 2014, a true and correct copy of the foregoing was served upon the following counsel of record via email through the court's CM/ECF system:

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CERTIFICATE OF COMPLIANCE

This brief complies with the type-volume limitation of Federal Rules of Appellate Procedure 32(a)(7)(B). The brief contains 9,986 words, excluding the parts of the brief exempted by Federal Rule of Appellate Procedure 32(a)(7)(B)(iii).

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Addendum

TABLE OF CONTENTS FOR ADDENDUM

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte ORBITALTECHNOLOGIES CORPORATION.

Appeal 2013-004262
Reexamination Control No. 90/011,864
United States Patent 7,220,018 B2
Technology Center 3900

Before KARL D. EASTHOM, KEVIN F. TURNER, and BRUCE R. WINSOR, *Administrative Patent Judges*.

EASTHOM, *Administrative Patent Judge*.

DECISION ON REQUEST FOR REHEARING

Orbital seeks relief in its *Request for Rehearing*, *see* 37 C.F.R. § 41.52, from the Patent Trial and Appeal Board Decision (March 27, 2013) affirming the Examiner's decision to reject claims 1-8 of the '018 Patent, U.S. 7,220,018 B2, *Marine LED Lighting System and Method* (May 22, 2007). (*See* Reh'g Req. 1, 14-16.)

In a rehearing request, appellants have the burden to "state with particularity the points believed to have been misapprehended or overlooked by the Board." 37 C.F.R. § 41.52 (a)(1). Orbital has not made the requisite showing.

Orbital asserts that the Board overlooked or misapprehended points concerning the Examiner's determination of a substantial new question of patentability (SNQ) and obviousness. Orbital explicitly requests the Board to vacate the "*SNQ Order*"[1] and implicitly requests the Board to alter its conclusion of obviousness. (*See* Reh'g Req. 15-16.)

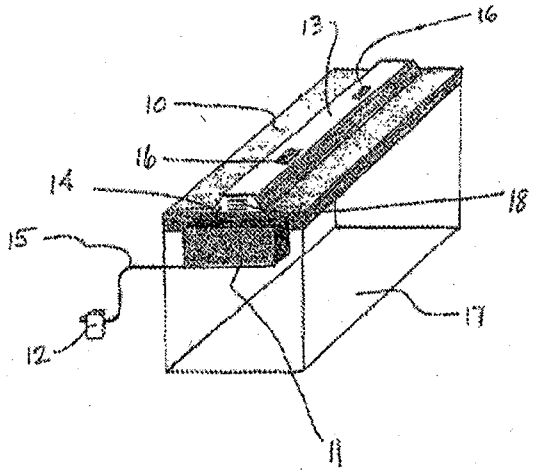
This appeal relates to another Board appeal, PTAB Appeal No. 2013-004264, for which Orbital also seeks rehearing, involving another of Orbital's patents, U.S. 7,473,008 B2. That rehearing decision issues concurrently herewith and is adopted and incorporated herein by reference.

We deny the requested relief.

Background

As the Decision notes, the '018 Patent describes a marine habitat LED (light emitting diode) lighting system. (Dec. 1.) Figure 1 of the '018 Patent depicts a housing 10 covering marine habitat 17 as shown below:

[1] *Order Granting/Denying Request for Ex Parte Reexamination* (Sept. 8, 2011).



The housing includes air inlet vents 18 and fans 16. An LED array (undepicted) is attached to the underside of housing 10 to light the marine habitat 17. (*See* Dec. 1.)

Obviousness

Orbital does not direct attention to a particular claim. According to Orbital, Orbital's contentions show that the Board overlooked Orbital's argument that "modifying Tomofuji to use an LED lighting system [as the Examiner proposes] . . . would render Tomofuji unsatisfactory for its intended purpose and change its principle of operation." (*Id.*)

Orbital contends that "the purpose of Tomofuji's cooling system is to 'prevent illuminator damage and/or fire accident,' even if the temperature inside the cover 'rises abnormally high due to e.g. lighting of an illuminating lamp.'" (Reh'g Req. 14 (quoting Tomofuji, Abstract).) Orbital also contends that "LED [lights] . . . generate little heat," so "Tomofuji's cooling system would not obviously . . . prevent fire," if used to cool LEDs. (Reh'g Req. 14.)

The Decision discusses part of the Examiner's obviousness rationale as follows:

> The Examiner finds and reasons that replacing Tomofuji's fluorescent lights with Kuiper's LEDs would have been obvious for the purpose of saving energy and to promote or prohibit various forms of aquatic plant growth as Kuiper teaches. The Examiner employs Lebens to further suggest a power supply for the LEDs and finds that the Tomofuji and Kuiper systems must inherently operate with power supplies. The Examiner also points out that cooling LED systems was well known in the art as evidenced by Ignatius's teachings.

(Dec. 19 (citing Ans. 42-43).)

Orbital does not challenge the Board's fact finding repeated *supra* that "cooling LED systems was well known in the art as evidenced by Ignatius's teachings." Orbital also does not challenge the Board's reasoning and fact finding that "[s]killed artisans, given the combined teachings, would have recognized that enough LEDs at a sufficient size or power for a desired application necessarily would create heat which would require cooling." (Dec. 20.)

A central purpose behind Tomofuji's lighting system is to provide lighting, i.e., *inter alia*, "to illuminate[] the fishes in a tank," and also "to utilize the [light] as a room interior design." (*See* Tomofuji ¶¶ 2-3.) Of course, the purpose of the cooling system is to cool the tank. Cooling a tank that has a sufficient number of LEDs to light a tank, or a tank and a room, would not change Tomofuji's principle, which involves lighting and cooling, or render the lighting and cooling system unsatisfactory for its intended

purpose of lighting and cooling. Consequently, Orbital fails to show an overlooked point concerning obviousness.

SNQ

Orbital characterizes the translation as "additional art" that cannot be used if not originally cited in, or provided with, the *SNQ Order* (*supra* note 1) according to *Belkin Int'l, Inc. v. Kappos*, 696 F.3d 1379 (Fed. Cir. 2012) and *In re Baxter Travenol Labs*, 952 F.2d 388, 390 (1991). (*See* Reh'g Req. 4, 12-13.) The Decision addressed various forms of the argument, reasoning that the translation, or the abstract, is not "additional art":

> As the Examiner recognizes, the "translation merely confirms the facts of the reference relied upon." (Ans. 12.) Such evidence is proper in a reexamination proceeding to show what the document teaches. *Cf. In re Baxter Travenol Labs*, 952 F.2d 388, 390 (1991) (extrinsic non-prior art declaration evidence can be used to show the material impliedly disclosed in a prior art document – evidence shows what those of skill in the art would have recognized as disclosed in the prior art reference). Orbital does not explain how the outcome would have been different had a translation been provided in the *SNQ Order*.

(Dec. 6-7.)

Orbital also argues that the Board should vacate the reexamination because the Examiner relied upon a machine translation of Tomofuji, but the Examiner did not supply the translation to Orbital, until after Orbital asked for a translation, which occurred after the final rejection. (*See* Ans. 3, n. 1, 7; Dec. 8 (citing Ans. 3, Reply Br. 11).) Orbital also argues that it did not waive the SNQ issue, as the Decision and the Examiner find, because

Orbital did not know the Examiner used a translation until at some point during prosecution after the *SNQ Order*. (*See* Reh'g Req. 4, 7-9.)

As the Decision notes, the record does not support Orbital's lack of knowledge theory. Orbital acknowledges that the Examiner's *SNQ Order* indicates that the Examiner provided an English translation. (Dec. 8.) The applicable portion of the *SNQ Order* follows:

> ***Submitted Prior Art in the Request***
>
> The substantial new question of patentability (SNQ) consideration is based on the following references:
>
> Japanese Patent No. 9-308409 to Tomofuji English Translation is provided herewith (hereinafter "Tomofuji").

(*See SNQ Order* 2.)

As the passage shows, as Orbital argues in its Reply Brief, and as the Decision notes, the *SNQ Order* indicates that the Examiner relied upon a translation, even if there were conflicting indications that the Examiner did not. Orbital also maintains that "[b]ased on the continuing record . . . elements of the underlying Tomofuji reference were discussed, and these elements were not found in the English language abstract that was provided with the Order." (Reh'g Req. 5.) These factors, independently or together, should have indicated to Orbital that the Examiner relied upon a translation and that the translation, to a Japanese language document, was an issue.

Orbital did not ask for a translation after receiving the *SNQ Order*, and waited until it filed its Appeal Brief to raise an issue about a lack of a translation to the Examiner. As the Decision notes, "Orbital does not apprise the Board of persuasive authority for granting relief based on waiting

for something which was not requested." (Dec. 9.) Orbital also does not dispute the finding that it could have obtained a free machine translation on a website or otherwise obtained a translation. (*See* Dec. 9; Reh'g Req. 8 (Orbital admits that "[a]gain, there is no dispute as to whether patentee could have obtained a different translation through other means.").)

Orbital now argues that it did not waive the SNQ issue by failing to raise it before the appeal, because the Examiner and the Board "do[] not explain how the patentee should have known to demand a translation." (Reh'g Req. 4.)[2] However, the *SNQ Order* itself, or the other factors noted, including the Japanese language document, indicate that a translation would be used by the Examiner. The *SNQ Order* puts Orbital on notice that the Examiner used a translation. The Japanese language document would have constituted a reasonable indication that a translation would be an issue.

Orbital essentially argues that an oversight by the Examiner, i.e., not providing the translation at the same time as the *SNQ Order*, should redound to a vacated procedure that began over two years prior. As the Decision explains, Orbital's tactical

> procedure not only would violate the clear guidance in the *SNQ Clarification,* it also would violate the clear statutory mandate requiring "all reexamination proceedings ... [to be] conducted with special dispatch within the Office." 35 U.S.C.§ 305. For example, depending on the merits, an examiner might vacate an earlier SNQ order, and regardless of the merits, most likely would supply a translation if so requested in order to expedite prosecution.

(Dec. 11.)

[2] The Decision does consider the SNQ issue and other related issues in the alternative. (*See* Dec. 18.)

Further, according to the Examiner's Answer, after Orbital filed the Appeal Brief (August 16, 2012), the Examiner contacted "Appellant . . . on September 4, 2012 to discuss the procedural issue of how to make the translation of Tomofuji of record as discussed below. Appellant *agreed* to [have the Examiner] *add the translation* as an attachment to an Examiner's Answer, *rather than re-open prosecution.*" (Ans. 3, n. 1 (emphasis added); *accord* Ans. 6).) The Examiner Interview Summary (interview Sept. 4, 2012, mailed Sept. 12, 2012) tracks the Answer:

> Examiner asked Mr. Longley . . . whether it would be desirable to attach the translation as an appendix to an Examiner's Answer or to re-open prosecution and provide it in a non-final rejection. Mr. Longley agreed to accept the translation as an appendix to an Examiner's Answer, but also recognized that is was within the discretion of the PTO to re-open prosecution.

The record reflects that Orbital elected to wait for the translation in the Answer. The Examiner added the translation and abstract to the Answer as an attachment, because Orbital declined the Examiner's offer to re-open prosecution.

Further, as the Decision notes, Orbital "*does not request that prosecution be reopened, further indicating that Orbital has not been prejudiced.*" (Dec. 16-17 (emphasis added).) Orbital states in its Appeal Brief:

> Nor would it be proper to reopen the reexamination merely to place a translation of the Tomofuji reference on record, because reopening prosecution to permit a new reexamination based on the same or similar art would not raise any substantial new question of patentability, and it would place an unreasonable and unjustifiable burden on the patentee to require an answer to such a proceeding under 37 C.F.R. § 1.515.

(App. Br. 62 (partially quoted in Dec. at 16.).)

After the Appeal Brief and Examiner Interview Summary, but before the Answer, Orbital filed a three-page Interview Summary (October 2, 2011). In it, Orbital states, *inter alia*, the following:

> The Office has discretion to reopen prosecution after filing of the Appeal Brief, based on appropriate procedures as defined by the Board. Respectfully, Patent Holder's representative submits that if prosecution is reopened, the arguments in the Appeal Brief should be considered on the merits.
>
> The Examiner's Interview Summary states that lack of translation for the Tomofuji reference is a procedural issue. . . . **This position is respectfully traversed**.
>
> . . .To the contrary, where there is no translation . . . there is no prima facie case . . . .
>
> The Examiner's Interview Summary states that Applicant's representative agreed to accept a translation of the Tomofuji reference in the Examiner's Answer. . . . **This position is respectfully traversed**.
>
> *With all due respect, the Patent Holder reserves the right to appeal the Order granting the Request for Reexamination based on the prior art of record in the Order*, and providing a translation in Examiner's Answer is not a remedy for this issue. In addition, if a translation (or any other new evidence) is provided in Examiner's Answer, the Patent Holder respectfully requests justification under the rules of the Board, so that a proper response may be prepared. Further, the Patent Holder respectfully submits that any new evidence provided in the Examiner's Answer would constitute new grounds for rejection, and should be treated accordingly.

Patent Holder's Interview Summary 2 (last italicized emphasis added by the Board).

Hence, as the record shows, Orbital essentially sought to preserve its options: "Where the patent holder respectfully traverses any position stated in the Examiner's Summary, it is understood that this is done to preserve the Patent Holder's rights." *Id.* at 3. The record shows that Orbital chose the right to appeal to ask the Board to vacate the *SNQ Order*, instead of re-opening prosecution. (*See* Dec. 17.)

In its Reply Brief, armed with the Examiner's translation, Orbital chose to maintain its appeal, rather than seeking a remand. That is, assuming for the sake of argument that it was not too late to ask to re-open after having waived a chance to re-open and having denied the Examiner's offer, Orbital repeats the Examiner's statements in the Interview Summary and in the Answer. Orbital states that its

> Summary of Interview . . . expressly traverses any such characterization of Patentee's Position. *In particular, Patentees' Interview Summary acknowledges that the Office has discretion to reopen prosecution, but Patentee nonetheless explicitly reserves the right to appeal based on the lack of translation, including the right to appeal the Order granting the Request for Ex Parte Reexamination.*

(Reply Br. 11 (emphasis added).)

In other words, the record shows that Orbital "explicitly" maintained its appeal to the Board, even in the Reply Brief, after having waived a remand in its Appeal Brief, and after declining the Examiner's offer prior to filing its Reply Brief. Orbital does repeat, as noted *supra*, a portion of Patent Holder's Interview Summary, but that portion merely obliquely states a point of law: "any new evidence provided in the Examiner's Answer

would constitute new grounds of rejection, and should be treated accordingly."

Even if repeating portions of the Patent Holder's Interview Summary somehow constitutes a request to the Board to re-open prosecution, prior to that, Orbital rejected the Examiner's explicit offer to re-open prosecution. Therefore, Orbital waived the right to remand to address any due process or fairness issues that would have been mooted by accepting the explicit offer to re-open prosecution. Any due process concerns based on "new evidence" in the translation are intertwined with the SNQ issue, according to Orbital's arguments, which appear to be predicated, primarily, on alleged inconsistencies between the *SNQ Order* and the translation, as discussed below. Pursuant to the "special dispatch" mandate under 35 U.S.C. § 305, it would not be fair to the public, including other applicants, to allow Orbital to appeal to the Board for some issues and seek a remand for other intertwined issues. Orbital declined the offer by the Examiner for the same remedy, and the PTO expended valuable public resources in writing the Answer, docketing the appeal, and forming a Board panel to consider the myriad of appeal issues.

Moreover, Orbital chose "*explicitly* . . . to appeal based on the lack of translation, including the right to appeal the Order granting the Request for *Ex Parte* Reexamination." (Reply Br. 11.) Orbital also requested the Board to exclude the translation "from consideration in the reexamination," because it allegedly was not "considered in determining a substantial new question of patentability." (Reply Br. 17 (citing *Belkin Int'l, Inc. v. Kappos*, 696 F.3d 1379 (Fed. Cir. 2012).) Orbital similarly disputed that the "machine translation . . . can be relied upon in maintaining any final

rejection . . . because the translation was not on record at the time the rejections were made final, and it was not on record when the reexamination was ordered." (Reply 18.)

However, as stated, the record reflects that the Examiner did consider the translation, and the Examiner offered to cure any deficiency of due process, fairness, or otherwise by making the final rejection a non-final rejection, but Orbital declined the offer. The record shows that Orbital did know about the translation prior to filing its Appeal Brief. (*See* App. Br. 62.) During a re-opened prosecution, which Orbital declined, Orbital could have addressed, before the Examiner, how the translation surprised Orbital, caused a material shift during prosecution, or otherwise prejudiced Orbital. During a re-opened prosecution, Orbital also could have followed the stated procedure for raising and preserving the SNQ question before the Examiner and the Director. (*See* Dec. 7 (discussing SNQ Clarification procedures to preserve SNQ issues).)

Orbital maintains that the Decision overlooks that the Examiner and Orbital do not agree on what Tomofuji teaches or discloses. (Reh'g Req. 10.) The Examiner "find[s] that Appellant provided a general outline of the features of Tomofuji which were consistent with the teachings relied upon by Examiners in the rejections." (Ans. 5.) If Orbital is correct, and the disagreement relates to the contents of the translation, this exemplifies why Orbital should have accepted the Examiner's offer to re-open prosecution.

To support its argument of a disagreement with the Examiner over what Tomofuji teaches, Orbital quotes a passage from the Decision that explains why there is no material inconsistency between the *SNQ Order* and the translation. (*See* Reh'g Req. 11 (quoting Dec. 13).) Orbital does not

describe how the passage from the Decision fails to describe Tomofuji's teachings accurately, or where Orbital disagrees with the facts. (*See* Reh'g Req. 10-11.)

The Decision generally finds that Tomofuji's figures depict a housing, a light source, and a cooling system, over a tank. (*See* Dec. 5-6.) Orbital repeats the Board's finding that in Tomofuji, "the 'light' 2 simply includes the housing cover 3 and the lamps 4 therein," and that the Examiner refers to the "light 2 as a housing." (*See* Reh'g Req. 11-12.) Orbital complains that "it is material to know whether the reference 2 of Tomofuji is relied upon as a housing or a light." (Reh'g Req. 11.) This argument exalts form over substance.

The housing cover 3, a part of the light fixture 2, reasonably corresponds to the "housing" recited in claim 1. The Abstract refers to a "cover" 3, and the translation similarly refers to "covering 3." (Tomofuji ¶ 20.) The translation refers to "fluorescent lamp 4" (*id.*), while the Abstract refers to "the cover of an illuminator." These documents do not conflict with one another in any material manner that has been identified by Orbital. Reliance on either one, or both, does not show an invalid SNQ, unfairness, or a lack of notice.

The Examiner's *SNQ Order* refers to a "housing 2 for a lighting system 4." (SNQ Order 7.) Tomofuji's Figure 1, which is the same figure depicted at the published Abstract, show numerals 2 and 3 side-by-side and pointing to the same area on the housing cover. Regardless of the particular numeral cited, Tomofuji's Figures 1-3 plainly show a housing within which reside lamps 4, corresponding to the claimed position of a "light source mounted to the inner side of said housing." Orbital does not dispute, with

specificity, the Board's or the Examiner's findings as to what Tomofuji materially teaches.

"All reexamination proceedings under this section, including any appeal to the Board of Patent appeals and interferences, will be conducted with special dispatch within the Office." 35 U.S.C. § 305. Of course, the procedures must be conducted with fairness to applicants and the public, while considering the special dispatch mandate. In this case, the record shows that Orbital chose to maintain its appeal to the Board and wait for the translation in the Answer, rather than accept the Examiner's offer to re-open prosecution. Orbital fails to show that the Board overlooked or misapprehended a material point in affirming the Examiner's decision to reject the claims on appeal.

Pursuant to 37 C.F.R § 41.52 (a) (1), this Rehearing Decision is designated to be a new rehearing decision only to the limited extent that it discusses findings of record not explicitly recited in the Decision to show that Orbital declined the offer by the Examiner to re-open prosecution and waived any right, predicated on the translation, to a remand by the Board. Orbital on a rehearing request, will have the right to point the Board "with particularity the points believed to have been misapprehended or overlooked by the Board" in making that finding. *See also* 37 C.F.R § 41.50 (d) ("The Board may order appellant to additionally brief any matter that the Board considers to be of assistance in reaching a reasoned decision on the pending appeal."). This Rehearing Decision does not constitute a new ground of rejection.

REHEARING DECISION

DENIED

Appeal 2013-004262
Reexamination Control Nos. 90/011,864
Patent 7,220,018 B2

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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte ORBITAL TECHNOLOGIES CORPORATION.

Appeal 2013-004262
Reexamination Control No. 90/011,864
United States Patent 7,220,018 B2
Technology Center 3900

Before KARL D. EASTHOM, KEVIN F. TURNER, and BRUCE R. WINSOR, *Administrative Patent Judges*.

EASTHOM, *Administrative Patent Judge*.

DECISION ON APPEAL

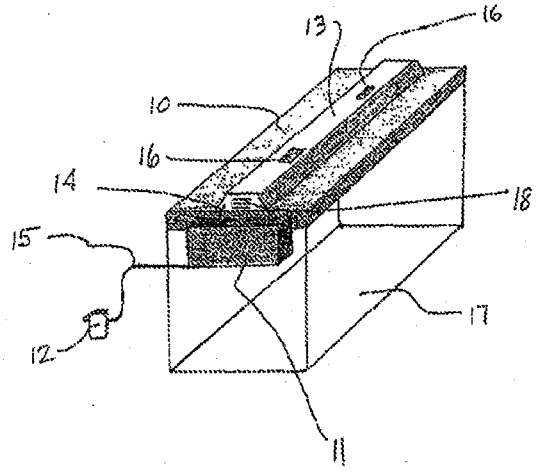
Appeal 2013-004262
Reexamination Control Nos. 90/011,864
Patent 7,220,018 B2

Appellant, Patent Owner Orbital Technologies Corporation, appeals under 35 U.S.C. §§ 134(b) and 306 from the Examiner's decision to finally reject claims 1-8 of U.S. 7,220,018 B2 *Marine LED Lighting System and Method* (May 22, 2007). Orbital also appeals the Examiner's determination of a substantial new question of patentability (SNQ). (App. Br. 12-13.) We have jurisdiction under 35 U.S.C. §§ 134(b) and 306.[1] This appeal relates to another Board appeal, PTAB 2013-004264, involving another of Orbital's patents, U.S. 7,220,008 B2, which recites similar claims rejected for similar reasons. That decision issues concurrently herewith and is adopted and incorporated herein by reference.

We AFFIRM.

STATEMENT OF THE CASE

The '018 patent describes a marine habitat LED (light emitting diode) lighting system. (*See* '018 Abstract.) Figure 1 of the'018 patent depicts a housing 10 covering marine habitat 17 as shown below:



[1] *See also* attached *Delegation of Authority in Ex Parte Reexamination Proceeding Appeal* (Chief Judge James D. Smith delegating authority to the panel to review SNQ issues).

The housing of Figure 1 includes air inlet vents 18 and fans 16. (*See* '018 patent, col. 4, ll. 17-31.) An LED array (undepicted) is attached to the underside of housing 10 to light the marine habitat 17. (*See* Fig. 2; App. Br. 9.)

The Examiner finally rejected claims 1-8 under 35 U.S.C. § 103(a) as obvious as follows:

1. Claims 1-3 and 5-7 based on Tomofuji, JP 9-308409 A (Dec. 2, 1997), Kuiper, WO 91/18970 (Dec. 12, 1991), Lebens, U.S. 6,305,818 B1 (Oct. 23, 2001), and Ignatius, U.S. 5,278,432 (Jan. 11, 1994).[2]

2. Claims 4 and 8 based on Tomofuji, Kuiper, Lebens, Ignatius and Janssen et al., *Enzyme Photosynthetic Efficiency of Dunaliella Tertiolecta Under Short Light/Dark Cycles,* Enzyme & Microbial Tech. 29, 298-305 (2001) [hereinafter Janssen].[3]

3. Claims 1, 2, 5, and 6 based on Tazawa, JP 10-162609 (June 19, 1998), Tomofuji, Lebens, and Ignatius.

4. Claims 3 and 7 based on Tazawa, Tomofuji, Lebens, Ignatius, and Kuiper.

---

[2] Orbital refers to a related rejection of these claims based on Kuiper, Tomofuji, Lebens and Ignatius – i.e., the order of references is slightly different, but the order is not deemed to create an important distinction here. (*See* App. Br. 12.) *See In re Mouttet*, 686 F.3d 1322 (Fed. Cir. 2012) ("where the relevant factual inquiries underlying an obviousness determination are otherwise clear, characterization by the examiner of prior art as 'primary' and 'secondary' is merely a matter of presentation with no legal significance.").

[3] Orbital refers to a related rejection of these claims based on Kuiper, Tomofuji, Lebens, Ignatius, and Janssen – i.e., the order of references is slightly different, but the order is not deemed to create be an important distinction here. (*See* App. Br. 12; note 2.)

5. Claims 4 and 8 based on Tazawa, Tomofuji, Lebens, Ignatius, and Janssen.

(*See* App. Br. 12.)

Appealed claim 1 follows:

1. (Original) A combination marine habitat and lighting system therefor comprising:

a marine habitat having an open top defined by a top edge and a lighting system including:

a housing connectable to said top edge to substantially cover said open top, said housing further including an inner side facing said open top when said housing is connected to said top edge and an opposite outer side;

an LED light source mounted to the inner side of said housing, said LED light source comprising at least one light engine having a plurality of individual LEDs capable of providing light at a wavelength from about 380 nm to about 690 nm;

a power supply sufficient to drive said LEDs;

a controller connected with said power source for controlling the activation status and the intensity of one or more of said individual LEDs; and

a cooling system provided in said housing.

ANALYSIS

Tomofuji, a Japanese language patent, is involved in all the rejections. On appeal, Orbital asserts various procedural attacks against the SNQ determination and the rejections primarily because the PTO did not provide Orbital with a translation of Tomofuji until after Orbital filed its Appeal Brief. Orbital never requested a translation and waited until its Appeal Brief to raise issues about a lack of a translation. The Examiner then supplied a translation in the Answer.

Figures 1-4 of Tomofuji depict a marine habitat lighting system as shown below:

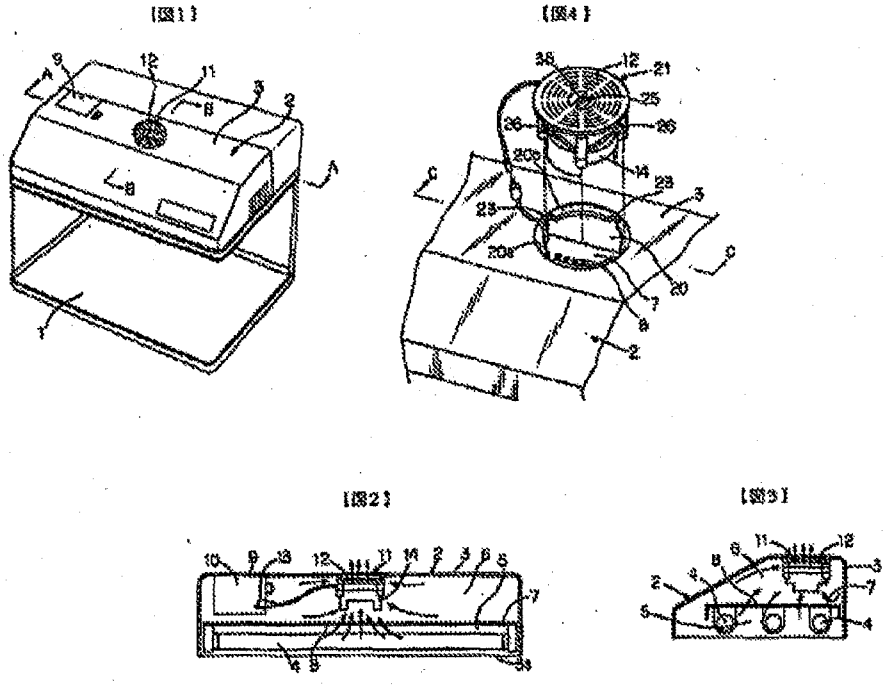


Figure 1 depicts an "illuminator cover" 3 having lamps 4 therein. (*See* Tomofuji Figs. 2, 3; Abstract). The cover 3 covers the marine habitat 1

and includes vents and a fan to cool the lamps 4. (*See* Tomofuji Figs. 1-4; Abstract.)

SNQ and Prima Facie Case - Lack of a Translation

Orbital argues that because the PTO did not provide an English translation of Tomofuji with the *Order Granting Request for Ex Parte Reexamination* (Sept. 8, 2011)[hereinafter *SNQ Order*], the SNQ is deficient and should be vacated. (*See* App. Br. 13.) According to Orbital, the SNQ is deficient because "no translation was provided, and the Request does not as a matter of law or fact raise any substantial new question of patentability *based on the prior art of record*." (App. Br. 60.) Orbital argues that by relying on a translation that was not of record, the Examiner did not employ "patents and printed publications" as required by 35 U.S.C § 303 (a) and 37 C.F.R. § 1.510(b)(1). (*See* App. Br. 13.) Orbital similarly attacks the prima facie case in the final rejection based on a lack of a translation as discussed further below.

Orbital's arguments lacks merit. The *SNQ Order* cites the Tomofuji patent and the English Abstract thereof. The applicable statute, 35 U.S.C. § 303 (a), does not require a translation to be cited or supplied: "[T]he Director may determine whether a substantial new question of patentability is raised by patents and publications . . . cited under the provisions of section 301 of this title." The translation is merely evidence of what the patent discloses and does not alter the citation of the patent. As the Examiner recognizes, the "translation merely confirms the facts of the reference relied upon." (Ans. 12.) Such evidence is proper in a reexamination proceeding to show what the document teaches. *Cf. In re Baxter Travenol Labs*, 952 F.2d 388, 390 (1991) (extrinsic non-prior art declaration evidence can be used to

show the material impliedly disclosed in a prior art document – evidence shows what those of skill in the art would have recognized as disclosed in the prior art reference). Orbital does not explain how the outcome would have been different had a translation been provided in the *SNQ Order*.

In addition, Orbital did not raise any SNQ issue or the particular translation SNQ issue until the appeal and thereby waives the issues as the Examiner persuasively finds. The Examiner relies on "*Clarification of the Procedure for Seeking Review of a Finding of a Substantial New Question of Patentability in Ex Parte Reexamination Proceedings*," Fed. Reg. Vol. 75, No. 122 (June 25, 2010) [hereinafter *SNQ Clarification*] (*see* Ans. 37-39 and Appendix 2 (quoting and attaching the *SNQ Clarification*). As the Examiner points out, the *SNQ Clarification* requires an applicant to seek SNQ relief from an examiner in order to preserve the issue before the Board:

> In order to preserve the right to have the BPAI review of [sic] the SNQ issue, a patent owner must first request reconsideration of the SNQ issue by the examiner. Accordingly, for *ex parte* reexamination proceedings ordered on or after June 25, 2010, the patent owner may seek a final agency decision from the BPAI on the SNQ issue only if the patent owner first requests reconsideration before the examiner (e.g., in a patent owner's statement under 37 CFR 1.530 or in a patent owner's response under 37 CFR 1.111) and then seeks review of the examiner's SNQ determination before the BPAI. In its appeal brief, the patent owner is encouraged to clearly present the issue and arguments regarding the examiner's SNQ determination under a separate heading and identify the communication in which the patent owner first requested reconsideration before the examiner.

(Ans. 37-39 (emphasis by the Examiner, quoting the *SNQ Clarification* at 36357).)

Orbital variously argues as follows:

(A) "Patentee did not wait to point out the issue . . . . Patentee made a good faith attempt to advance prosecution." (Reply Br. 9.)

(B) "[B]ased on the record, it is proper raise the issue when no translation is provided in the next office action; that is, the final rejection dated April 20, 2012 from which the Appeal is made." (*Id.* at 10.) "Patentee . . . *raised the issue at the first known opportunity*, following the final rejection of February 23, 2012, from which this appeal is made." (*Id.* at 11 (emphasis added).)

(C) The SNQ issue has been raised "by challenging any substantial new question of patentability based on hindsight." (App.Br. 61.)

Notwithstanding Orbital's various arguments, the record supports the timing under option (B) *supra*. Orbital waited until its Appeal Brief – i.e., "at the first known opportunity" according to Orbital - to raise the issue of an improper SNQ based on a lack of a translation of Tomofuji. (*See, e.g.*, Ans. 3 (Orbital objected "for the first time" in the Appeal Brief); *accord* Reply Br. 10-11.)

Orbital also maintains that it prosecuted in good faith and did not need to request a translation earlier because "the record is in fact unclear as to whether a translation was to be provided." (Reply Br. 11.) According to Orbital, the *SNQ Order* indicates that an English translation of Tomofuji is attached to the Order, but the Examiner's *List of References Cited by Applicant and Considered by the Examiner* (Sept. 14, 2011) indicates that only an English Abstract "was considered when determining a substantial new question of patentability under 35 U.S.C. § 303(a)." (Reply Br. 10.)

Orbital's argument essentially is that since it was unsure of whether it would be sent a translation after it received the *SNQ Order*, there was no need to require one until the appeal. However, Orbital's procedure violates the procedure required by *SNQ Clarification*. Orbital does not apprise the Board of persuasive authority for granting relief based on waiting for something which was not requested. As soon as the Examiner became aware of Orbital's complaint – i.e., after Orbital appealed – the Examiner attached the machine translation employed by the Examiner to the Answer for Orbital. (*See* Ans. 4-6; Reply Br. 11.) Orbital also could have obtained a free copy from various websites. (*See* Ans. 11, n. 4.) The Examiner obtained a machine translation "on August 29, 2011 [prior to the *SNQ Order*] . . . to confirm the facts relied upon for the Order mailed September 8, 2011, the Non-Final mailed December 5, 2011 and the Final Action." (Ans. 3.)[4]

Perhaps recognizing that the *SNQ Clarification* shows that Orbital did not preserve the issue, as indicated *supra*, Orbital alternatively argues that it did preserve an SNQ issue by arguing in its earlier Amendments (Feb. 8, 2012) that the Examiner and Requester used "impermissible 'hindsight'" to combine the references. (*See* Reply Br. 28 (citing Amendments at 4).) However, this prior "hindsight" argument does not mention the translation or otherwise join the translation issue to the prima facie issue, let alone the SNQ issue. (*See* Ans. 5 ("Appellant . . . did not request reconsideration of the determinations of the SNQ[]").) As the Examiner finds, the Amendments also fail to address the merits of "any of

[4] The dates "8/29/11" on the bottom of the Abstract and the English machine translation corroborate the Examiner. (*See* Ans. Attachment 1.)

the findings outlined in the [SNQ] Order" (Ans. 38) and instead "Patentee traverses the rejections of claims 1-8" outlined in the "Office Action Dated December 5, 2011" (Amendments 4).

The *SNQ Order* finds, *inter alia*, that "a reasonable examiner would find the teachings of Tomofuji, Kuiper, L[e]bens and Ignatius to be important in determining the patentability of claims 1-8 of the '018 Patent." (SNQ Order 6.) As the Examiner recognizes, the prima facie case and SNQ are distinctly different. (*See* Ans. 38-39 (quoting MPEP 2242 to show that SNQ is distinct from a prima facie case).) For example, as indicated, the SNQ issue involves whether "a reasonable examiner would consider the teaching to be important in deciding whether or not the claim was patentable. . . . It is not necessary that a '*prima facie*' case of unpatentability exist as to the claim in order for 'a substantial new question of patentability' to be present as to the claim." (MPEP § 2242; *accord* Ans. 39 (quoting *inter alia* same).) In other words, Orbital's truncated arguments to the Examiner prior to the Appeal Brief directed to a prima facie case do not even address the SNQ issue, let alone preserve it. Orbital fails to explain why the asserted combination of prior art references, with or without a Tomofuji translation, would not be important to a reasonable examiner in determining patentability according to the SNQ determination.

Orbital also argues that the lack of a translation of record means "as a matter of law and fact the prior art is not read as a whole . . . and there is no substantial question of patentability *based on the* prior art of record, as required under 35 U.S.C. § 303(a) and 37 C.F.R. § 1.515." (App. Br. 59.) Again, Orbital did not preserve this SNQ argument. If Orbital's legal theory is correct, an appellant need only wait until the appeal, after an examiner

considers a variety of other evidence and arguments directed to patentability, and then argue that as a matter of law, the failure to provide a translation automatically means there is an improper SNQ. Such a procedure not only would violate the clear guidance in the *SNQ Clarification,* it also would violate the clear statutory mandate requiring "all reexamination proceedings . . . [to be] conducted with special dispatch within the Office." 35 U.S.C. § 305. For example, depending on the merits, an examiner might vacate an earlier SNQ order, and regardless of the merits, most likely would supply a translation if so requested in order to expedite prosecution.

Assuming for the argument that Orbital did preserve the issue, Orbital similarly maintains that the reference must be read "as a whole" as a matter of law which Orbital argues is impossible without a translation. (*See* App. Br. 59.) Similarly, Orbital maintains that without that translation, "there is no way for the patentee to know how exactly any substantial new questions of patentability were determined, much less a basis on which to fully traverse the proposed rejections on the merits." (App. Br. 60.)

Rather than showing a reason to vacate the *SNQ Order* as Orbital urges, these arguments exemplify why Orbital should have asked the Examiner for a translation. Moreover, the record shows, contrary to Orbital's asserted lack of knowledge about the content of Tomofuji, that Orbital was fully aware of that content and used it to traverse the proposed rejections prior to the appeal.

For example, as the Examiner points out (*see* Ans. 13-14), prior to the appeal, Orbital discusses Tomofuji as follows:

> Applicant respectfully submits that Tomofuji (1997) is directed toward a cooling device for an illuminator for an

> aquarium fish basin. However, Tomofuji discloses a marine lighting system for illuminating marine life known since the 1960s (*see* attached *Curran Declaration,* paragraphs 6 and 7) and is simply an extension of these well-known marine lighting systems referenced in the '018 patent which discloses a fluorescent marine lighting system having an aquarium cover and vents for venting heated air generated by the light radiating from the fluorescent bulbs. As evidenced by Figure 3, Tomofuji implements fluorescent lighting, but there is no disclosure or teaching of using LEDs to light the aquarium where the light and heat source is NOT in the housing volume and that the LED chips needing to be cooled are normally facing the aquarium toward the marine life and are typically shielded from cooling that occurs in the housing. Moreover, while Tomofuji discloses an air release portion and a fan motor (*see* Tomofuji, Abstract), nowhere in Tomofuji is there motivation or suggestion as to whether the same or similar device would be useful were an LED to be provided. Even as mentioned, one could cool a volume near the LED light source without cooling the LED light source and fail; this is one of the basic and fundamental gaps that the subject patent addresses that was not obvious to persons skilled in the art. In addition, without any disclosure or teaching of LEDs, there is no disclosure or teaching of a controller for such LEDs.

(Reply to Office Action 8-9 (April 13, 2012) (attaching Curran Declaration).)[5]

As the passage *supra* shows, Orbital describes Tomofuji's "system for illuminating marine life known since the 1960s," including and "vents for venting heated air generated by the light radiating from the fluorescent bulbs," and the "fluorescent lighting," and argues that Tomofuji does not

[5] Orbital states that the Curran Declaration has not been entered and does not point to it to support its position. (*See* App. Br. 67.) The companion Board decision, PTAB, 2013-004262, addresses a similar Curran declaration.

disclose LEDs. No dispute exists about what Tomofuji teaches. Orbital does not allege that the Examiner incorrectly finds a claim element in Tomofuji. Orbital merely asserts a "lack of consistency" because the Examiner allegedly relied partly on the "English language abstract" and "it is not clear from the record how the machine translation was relied upon in the Order granting the reexamination." (Reply Br. 16.)

To support the latter argument, Orbital refers to the Order which states that "'the light sources are mounted within the housing 2.'" (Reply Br. 15 (quoting Order).) Orbital then points out, to further show inconsistency, that according to the machine translation, the "reference 2 is a light, not a housing" and that "reference 4 refers to florescent lamps 4 arranged in covering 3, not light sources mounted within housing 2." (*See* Reply Br. 15.) Contrary to the argument, there is no material inconsistency: the "light" 2 simply includes the housing cover 3 and the lamps 4 therein such that the Examiner's reference to the light 2 as a housing reasonably apprises Orbital of the basis for the claim rejections. (*See* Tomofuji Figs. 1-4; *accord* ¶¶ 13-16.) Orbital refers to similar seeming inconsistencies related to the "cooling fan," and "fan motor 14," but Figures 1-4 clearly show a fan and Orbital does not dispute that. (*See* Reply Br. 15.)

Orbital similarly argues that the "Request . . . relies on detailed knowledge of the underlying Tomofuji text" without a translation of record including the following description: "'Air (represented by arrows in Figures 2 and 3) is drawn from the bottom of each illuminating lamp 4, through an internal cooling channel 8 of plate 7, and exhausted through top vents 12 of the cover 3.' *See* Request filed 8/17/2011, p. 31. . . ." (App. Br. 59 (quoting Request for Reexam).) Orbital complains that of these

elements, "only 3 and 12 are identified in the Abstract . . . therefore, this is highly problematic . . . where these elements cannot be determined based on the prior art of record." (*See id.*at 59-60.)

In other words, according to Orbital, the Examiner and Requester relied on a translation not yet of record and identified elements that are not identified in the abstract. It is not clear why this means the *SNQ Order* should be vacated. If Orbital had a question about what the reference teaches, it could have obtained or asked the PTO for a translation. In any event, with or without the translation or the abstract, Orbital fails to show any material discrepancy as to what Tomofuji teaches in relation to the claimed subject matter. Orbital's arguments fail to show how the translation conflicts in a material way, if any, with the English abstract or the underlying patent. The Examiner and Orbital virtually agree as to the material teachings involved in Tomofuji. Given the simple nature of Tomofuji's disclosure (*see e.g.*, figures *supra*) and the claimed invention, Orbital fails to explain why the SNQ Order should be vacated.

Hence, assuming arguendo Orbital did preserve the SNQ issue, given the simple nature of Tomofuji's system which was well-known back to the 1960's according to Orbital, and given the simple nature of the claimed invention, "a reasonable examiner would consider the teaching [even without a translation] to be important in deciding whether or not the claim was patentable." (*See* MPEP § 2242.) As stated, the record reflects that no material dispute exists as to what the reference teaches. As the Examiner finds, Orbital's Amendment fails to address the specific findings in the SNQ. (Ans. 38.) Orbital's Brief also fails to address the specific findings. (*See*

App. Br. 61.) Orbital has failed to explain substantively or procedurally how the Examiner's SNQ determination is deficient.

In a similar procedural attack asserting a lack of a prima facie case based on a lack of a translation to Tomofuji, Orbital also cites to *Ex parte Jones*, 62 USPQ2d 1206 (BPAI 2001) (unpublished) and states that an Examiner cannot rely "on the English-language Abstract (only) of a foreign-language reference, where there is no translation of the underlying document." (App. Br. 29.) On the other hand, Orbital also states that "the Office explicitly relies on elements in the Tomofuji reference that do not appear in the Abstract, and are found only in the underlying Japanese text." (*Id.*) Orbital here makes two conflicting arguments: the Examiner relied only on the Abstract, and the Examiner did not rely only on the Abstract. The record reflects that the Examiner does not only rely solely on the Abstract. For example, the Examiner relies on figures in Tomofuji. The Examiner also relies on the translation. (*See* Ans. 9-10; 41-60.)

Jones (which is not precedential) does not help Orbital. *Jones* does not address the timing procedure for providing a translation or even require the Examiner to provide a translation to an applicant unless an applicant requests one. *Jones* directs the examiner to rely on a translation if one is available and at the least, supply it on appeal so that the Board need not "expend[ ] the resources" and also because the Board is "primarily a board of review." *See Jones*, 62 USPQ2d. at 1209. *Jones* notes that reliance by the Board on a translation upon which an examiner has not relied may raise new issues and warrant a new ground of rejection, *see id.*, but that situation is not in play here. Further, Orbital does not seek reopening of prosecution

or otherwise claim surprise or allege that the Examiner's Answer relies on new material facts found only in the Tomofuji translation.

Jones states that an applicant should either try to obtain a translation or "request the examiner to supply a translation. If a translation is not supplied by the examiner, the applicant may wish to consider seeking supervisory relief by way of a petition (37 CFR § 1.81) to have the examiner directed to obtain and supply a translation." *Jones*, 62 USPQ2d. at 1208-1209. Orbital cites *Jones* but does not follow its outlined procedure.

As indicated, the Examiner supplied the translation after Orbital raised the issue. Orbital apparently never actually asked for a translation, even on appeal. (*See* Ans. 10-11). Hence, Orbital's complaint is that it was denied something which it did not request. The Examiner points out that "free translations are available from various websites." (Ans. 11, n. 4.) Finally, while the Board has authority to decide the SNQ issue and does so here, Orbital's central issue is in actuality a translation issue in disguise. Issues premised on a lack of a translation are reviewable properly by petition to the Director. *See, e.g., Ex parte Julia Valles Camps and Xavier Miquel Gutierriez* , No. 2009-001720 (BPAI 2010) (relying on and discussing *Jones* under similar circumstances). (*See* Ans. 3-13.)

Orbital did not seek relief properly by way of petition to the Director or by seeking relief from the Examiner and thereby waives the SNQ issue predicated on a lack of a translation at least for these two reasons. Even if Orbital did not waive the SNQ issue in general, Orbital does not show a substantive deficiency in the SNQ or show that the outcome would have been different had a translation been provided with the SNQ. Orbital also does not request that prosecution be reopened, further indicating that Orbital

has not been prejudiced: "nor would it be proper to reopen prosecution merely to place a translation of Tomofuji on record." (App. Br. 62.) Orbital fails to address the merits of the SNQ with more than truncated arguments. Sustaining the rejections as discussed below further shows that the Examiner did not err in finding an SNQ or a prima facie case.

Prior Art

Commendable illustrated summaries of the prior art of record appear in the Request for Reexamination and the Appeal Brief. Brief discussions of Kuiper and Ignatius immediately follow with further discussions of the prior art of record following in the ensuing discussion.

A. Kuiper

Kuiper teaches employing LEDs in "tubes, strips or panels that can be placed in the aqueous environment" (Kuiper 7, ll. 17-28), including in "open troughs or basins, or . . . closed containers or tanks." (Kuiper 7, ll. 31-32.) Such closed containers enable aquatic organism cultivation and "more accurate control of process conditions, such as temperature, pressure and composition of the gas above the aqueous environment" (Kuiper 7, ll. 30-36.) Kuiper's LEDs can be controlled to save energy "with impunity by periodically switching the light sources on and off according to time schedule in agreement with the time constant in question." (Kuiper 6, ll. 32-36.) Kuiper's LEDs "save an enormous amount of energy in comparison with normal sources of artificial light, which cover a much larger section of the light spectrum and, moreover, convert a large part of the energy supplied to them into heat." (Kuiper 4, ll. 16-19.)

B. Ignatius

Ignatius discloses that LEDs or "other optoelectronic devices may be used, such as cold cathode fluorescent devices." (Ignatius, col. 3, ll. 37-38.) "The array of LEDs . . . is preferably used to enhance or test plant growth. . . . However, the LED array may have other applications, such as the irradiation of animal or human tissue. In the latter applications, the LEDs may be selected to provide different ranges of spectral emissions, as desired." (*Id.* at col. 4, ll. 48-58.) An "array 10 includes an aluminum or copper-coated substrate 12 that acts as a heat sink for heat generated by LEDs 14." (*Id.* at col. 3, ll. 38-40.) "Array 10 may consist of any number of sets of LEDS, with six sets of LEDs being preferred in a single modular housing, as depicted in FIG. 4." (*Id.* at col. 3, ll. 54-56.)

"Yet another advantage is that the light intensity may be continuously varied from a zero output up to a maximum output, which may equal or exceed the equivalent of one sun output (2000 micro-mols per second per meter squared) from an array that is only 3 inches by 4 inches in size." (*Id.* at col. 3, ll. 1-6.)

"The housings in which the arrays are disposed may be used separately or as modular components of a larger system." (*Id.* at col. 3, ll. 7-8.) The modular housing 28 unit has air-inlets 30, a fan, and a glass plate 34 to protect the LED array which can be mounted on a cooling substrate 12 as indicated *supra* and an additional finned-type heat sink 36, 38. (*See* Fig. 5.) The glass panel 34 on the outside of the housing allows the LEDs to illuminate plants and other objects. (*Id.* at col. 5, ll. 4-12; Figs. 4, 5.)

Rejections

I. Claims 1-3 and 5-7 - Tomofuji, Kuiper, Lebens, and Ignatius

The record supports the Examiner's findings, rationale and conclusion, which are adopted and incorporated herein by reference. (*See* Ans. 12-24; 41-53.) Orbital's arguments focus on claim 1 which is selected to be representative of the group except as otherwise noted.

As the Examiner finds, notwithstanding Orbital's arguments, Tomofuji discloses the limitations of claim 1 except for the LEDs. (*See* Ans. 41-43.) Tomofuji teaches a combination marine habitat and lighting system with an open top tank 1, a housing cover 3, and a fan motor 14 with cooling means including cooling fans, air discharge 11, and light sources 4 mounted to an inner side of the housing over the open top, an implicit power supply, and a cooling system 11. (*See* Ans. 41; Tomofuji translation ¶¶ 14-16; Figs. 1-4.)

The Examiner finds that Kuiper teaches LED lights in a combination marine habitat and lighting system including a controller to control the individual LEDs. (Ans. 42.) The Examiner finds and reasons that replacing Tomofuji's fluorescent lights with Kuiper's LEDs would have been obvious for the purpose of saving energy and to promote or prohibit various forms of aquatic plant growth as Kuiper teaches. The Examiner employs Lebens to further suggest a power supply for the LEDs and finds that the Tomofuji and Kuiper systems must inherently operate with power supplies. The Examiner also points out that cooling LED systems was well known in the art as evidenced by Ignatius's teachings. (*See* Ans. 42-43.)

As discussed *supra*, Orbital asserts that "there is no actual prima face case of obviousness" (App. Br. 30) because the Examiner relies on "elements of the Tomofuji reference . . . found only in the underlying Japanese text." (App. Br. 29.) To the contrary, no dispute exists that the claim elements are found in the reference. In addition to Orbital explaining what Tomofuji teaches as noted *supra*, Orbital's discussion of Tomofuji also appears similar to or the same as the Examiner's. (*See* App. Br. 15-17.) Orbital does not explain persuasively how the Examiner erred in finding and determining that the combination renders obvious the claim elements.[6]

Orbital's remaining arguments reduce to the assertion that it would not have been obvious to replace one type of light for another – Tomofuji's fluorescent light system with Kuiper's LED light system. (*See* App. Br. 34-36.) Orbital asserts that the proposed modification of Tomofuji would change its principle of operation because LED lights operate cooler than fluorescent light bulbs and LED lights would not need to be cooled with Tomofuji's system. (App. Br. 35-36.)

However, Kuiper and Ignatius each teach, essentially, that LEDs emit less heat than other lights. (*See supra* Prior Art A, B.) Skilled artisans, given the combined teachings, would have recognized that enough LEDs at a sufficient size or power for a desired application necessarily would create heat which would require cooling, like Tomofuji's fluorescent light system and Ignatius's LED system. (*See* Ans. 42-43 (citing Ignatius at col. 2, ll. 40-49); Kuiper 4, 10-12 and Ignatius at col. 5, ll. 4-12.).) For example, Ignatius

[6] Orbital also asserts that feature 4 is not identified in the English abstract. However, Orbital does not dispute that Tomofuji discloses fluorescent lamps 4 as the Examiner finds. (*See* App. Br. 16.)

describes an inexpensive system using a variable amount of LEDs to produce minimal heat as compared to metal halide or other prior art lamps, but the LED system preferably includes a "cooling means such as a fan or active heat sink for cooling the interior of the housing." (Ignatius, col. 2, ll. 41-44.)

Claim 1 broadly reads "a cooling system provided in said housing." Claim 1 does not even require the cooling system to cool the LED lights. As support for claim 1, Orbital's Appeal Brief describes the cooling system as follows: "A cooling system (13, 21, 35, see also Figs. 1, 3, above; Fig. 6, below) is provided in the housing (10, 20, 26.) (App. Br. 9.) The ''018 patent refers to a "fan-based cooling system 13. The system 13 includes a fan housing with one or more fans 16 and a plurality of air inlet vents 18." ('018 patent, col. 4, ll. 25-27.) Appellant's reference to element 20, a watertight housing, points to the "heat circulation system 21. The system 21 includes water inlet and outlet ports to dissipate the heat from the LED via the surrounding water." ('018 patent, col. 5, ll. 16-18.)

In general, according to the '018 patent: "The cooling system uses either natural convection with the air to dissipate heat in a top-mounted lighting system, or through water cooling via conduction, forced water cooling or an air-water loop to cool the submersible lighting configurations." ('018 patent, col. 3, ll. 36-40.) If "the cooling system uses . . . natural convection with the air," then even without a fan-based cooling system, vents such as Tomofuji discloses would satisfy the claims because they would constitute part of "a cooling system . . . in said housing." In any event, Tomofuji teaches a cooling system with vents and fans, Kuiper does not teach away from a cooling system, and "Ignatius . . . teaches a cooling

system for LEDs since they do emit heat in use.") (*See* Ans. 17 (citing Ignatius at col. 5, ll. 4-12).)

Orbital argues that Ignatius "does not suggest the use of cooled LED systems in an open top aquarium environment . . . to the contrary, Ignatius teaches that LED light systems need protection from the environment, and should be used in dry applications instead." (App. Br. 39 (citing Ignatius at col. 2, ll. 40-49; col. 5, ll. 19-61).) Orbital further relies on "Janssen . . . which also teaches that the Ignatius device should be used *outside* aquarium environments, not inside the cover of an open top marine habitat, as recited in claim 1." (App. Br. 39.)

These assertions about an "open top aquarium environment" introduce some confusion into the argument because the claimed housing "substantially cover[s] the open top" – i.e., the claimed habitat is not open when the housing is attached. In any event, the prior art of record does not support Orbital's arguments for various reasons. First, as the Examiner recognizes, Orbital's arguments improperly attack the references individually. (Ans. 18, n. 6.) Second, contrary to Orbital's arguments, Janssen does not disparage or even discuss Ignatius. (*See* Ans. 18-19.) Third, as the Examiner also recognizes, neither Janssen nor Ignatius requires that "the only place for the array is outside and not in the housing." (*See* Ans. 19.) "One having ordinary skill in the art would understand this implies the lights are simply not placed *in the water*." (*Id.* (emphasis added).)

Further, Ignatius supports the Examiner's rationale. Ignatius discloses modular housings with an open-vent fan based cooling system to cool a panel of LEDs. (*See supra* Prior Art B.) Notwithstanding that a glass panel

protects the Ignatius LED substrate from the environment, the inside of the housing remains open to moisture in the air or otherwise due to the open vent system. (*See* Ignatius Figs. 4 and 5; *supra* B.) Kuiper discloses similar LED strips or panels, such that Ignatius and Kuiper both suggest that the LED strip or panel easily could have been employed in place the fluorescent lamps of Tomofuji. Tomofuji's vented cover 3 and tank 1 and Ignatius's modular housings would have provided similar protection to the Kuiper LED panels or strips or the similar Ignatius LED substrate.

As also indicated *supra*, Ignatius also discloses that fluorescent lights and LEDs can be interchangeable, further suggesting the modification. Orbital argues that combination involving Kuiper points artisans to a preference for LEDs because LEDs save power and produce desired wavelengths. Even if this teaches away from "any proposed combination with a traditional (e.g., fluorescent) light source," (App. Br. 38-39), Orbital's argument supports the Examiner's finding that the combination suggests replacing the fluorescent lights of Tomofuji with LEDs.

As Ignatius teaches, varying amounts of power and different wavelengths can be used, thereby suggesting use in a variable cooling system depending on the power. Kuiper directly supports this type of control by teaching the use of LEDs in closed tanks to cultivate aqueous organisms while regulating the temperature thereof for optimal growth, all while saving energy. (*See supra* Prior Art, A, B.)

While Orbital also maintains that "Kuiper leads away [sic] the need for cooling in general" (App. Br. 39), Kuiper does not support Orbital for the reasons just noted. Kuiper discloses regulating temperature which would be required in a closed system having a wide range of LED power to promote

various forms of aquatic life. Ignatius further bolsters the cooling of LEDs. (*See supra* Prior Art B.)

Based on the foregoing discussion, Orbital has not shown error in the rejection of claims 1-3 and 5-7 based on Tomofuji, Kuiper, Lebens, and Ignatius.

II. Claims 1, 2, 5, and 6 Based on Tazawa, Tomofuji, Lebens, and Ignatius

Orbital's arguments focus on claim 1 which is selected to be representative of the group. Orbital describes Tazawa in its Appeal Brief. (App. Br. 26-29.) In addition to relying on the arguments addressed *supra*, Orbital also maintains that "Tazawa teaches away from fluorescent lighting as a general principle" and teaches decorative lighting which generates little heat so that a skilled artisan would not look to Tomofuji which teaches fluorescent lights. (App. Br. 41-42.)

Such arguments do not show unobviousness. For the reasons stated above, including the teachings of Ignatius, Orbital effectively recognizes that Tazawa suggests that LEDs on top of a water tank would have been advantageous to promote marine growth. (*See* App. Br. 26-27.) For example, Orbital states that "Tazawa . . . also promotes growth of living things inside the water tank." (App. Br. 28.) Based on the discussion above and the record, skilled artisans would have recognized that varying types of marine life require varying amounts of LED power which would necessitate including temperature regulation for optimal growth. (*See* Tazawa Abstract; Ans. 24-29 (finding that skilled artisans would have known that LEDs produce heat and would require cooling as Ignatius evidences).) Tazawa

teaches lighting up LEDs selectively and that they are "high-intensity directional-light LED lamps" which promote growth. (Tazawa, Abstract.)

To the extent Orbital argues that the combination does not disclose or suggest a housing, as the Examiner finds, Tazawa's element 4, is a "lighting apparatus" (*see* Tazawa Fig. 1, "Explanation of Reference Numbers") which appears to be a housing having an LED substrate 5 incorporated therewith and over an water tank 1. (Ans. 29-30; *accord* App. Br. 26.) Tomofuji discloses a similar light housing and aquarium as discussed *supra*. (*Accord* App. Br. 15.) Such a housing and light combination would have been obvious to hold lights above an aquarium to promote growth and visibility.

III. Claims 2-8 and Remaining Rejections

As indicated, Orbital relies on the unavailing arguments addressed *supra* to allege error in the rejections of claims 2-8. (*See* App. Br. 44-58.) While Orbital repeats limitations of claims 2-8, Orbital does not explain how the Examiner erred. With respect to claim 2, the purpose of at least Tomofuji, Kuiper, Tawaza, and Ignatius, as noted *supra*, is to promote marine or plant growth. (*See* Ans. 42-43; 57.) With respect to claim 3, the prior art of record, including an array of LEDs, necessarily discloses or suggests "at least one of . . . discreet LEDs." (*See* Ans. 33; 44 (citing Kuiper at 7, ll. 23-29).) As another example, claim 4 requires adjusting the range of light intensity in micro mols per square meter per second, a unit which Ignatius and Janssen each discuss such that skilled artisans would have recognized varying the intensity to suit the desired organism growth, as the

Examiner finds. (*See* Ans. 54 (citing Janssen at 300-301, §§ 2.2, 3.1); Ignatius, col. 3, ll. 1-6.).)

Claims 5-8 are similar in scope to claims 1-4. Orbital essentially presents the same or similar arguments as presented for claims 1-4 and fails to show error in the Examiner's rejections. (*See* App. Br. 46-47.) The Examiner's responses and findings with respect to claims 1-8 are adopted and incorporated herein by reference. Orbital has not shown error in the SNQ determination or the rejections of claims 1-8.

CONCLUSION

"For over half a century, the Court has held that a 'patent for a combination which only unites old elements with no change in their respective functions . . . obviously withdraws what already is known into the field of its monopoly and diminishes the resources available to skillful men.'" *KSR Int'l. Co. v. Teleflex Inc.*, 550 U.S. 398, 415-416 (2007) (quoting *Great Atl. & Pac. Tea Co. v. Supermarket Equip. Corp.*, 340 U.S. 147, 152-153 (1950).) Employing LEDs in place of Tomofuji's fluorescent lights, or cooling Tazawa's modified LED system, "only unites old elements" with no change in function of the prior art cooling and lighting marine tank systems and thereby constitutes a "principal reason" for finding the '018 patent claims 1-8 obvious. *See KSR*, 550 U.S. at 416.

AFFIRMED

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Appeal 2013-004262
Reexamination Control Nos. 90/011,864
Patent 7,220,018 B2

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(12) **United States Patent**
Crabb et al.

(10) **Patent No.: US 7,220,018 B2**
(45) **Date of Patent: May 22, 2007**

(54) **MARINE LED LIGHTING SYSTEM AND METHOD**

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(73) Assignee: **Orbital Technologies, Inc.**, Madison, WI (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 109 days.

(21) Appl. No.: **11/012,702**

(22) Filed: **Dec. 15, 2004**

(65) **Prior Publication Data**

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Related U.S. Application Data

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(51) **Int. Cl.**
F21V 33/00 (2006.01)

(52) **U.S. Cl.** **362/234**; 362/231

(58) **Field of Classification Search** 362/231, 362/234, 101, 295; 119/266
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

6,340,868 B1 * 1/2002 Lys et al. ..... 315/185 S
6,523,976 B1 * 2/2003 Turnbull et al. 362/231

* cited by examiner

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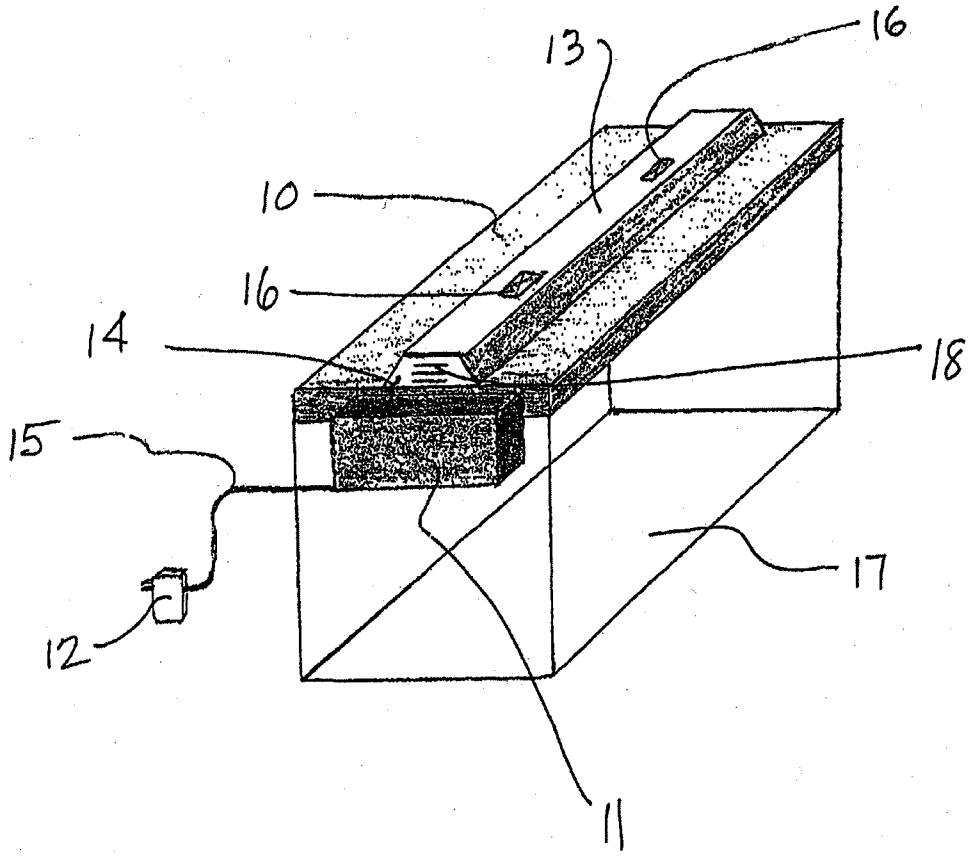
(57) **ABSTRACT**

A method and apparatus of lighting a marine habitat for growth utilizing an LED light system. The light system includes an LED light source, a power supply for such light source and a controller for controlling the activation status and the intensity of the LED light source.

8 Claims, 4 Drawing Sheets



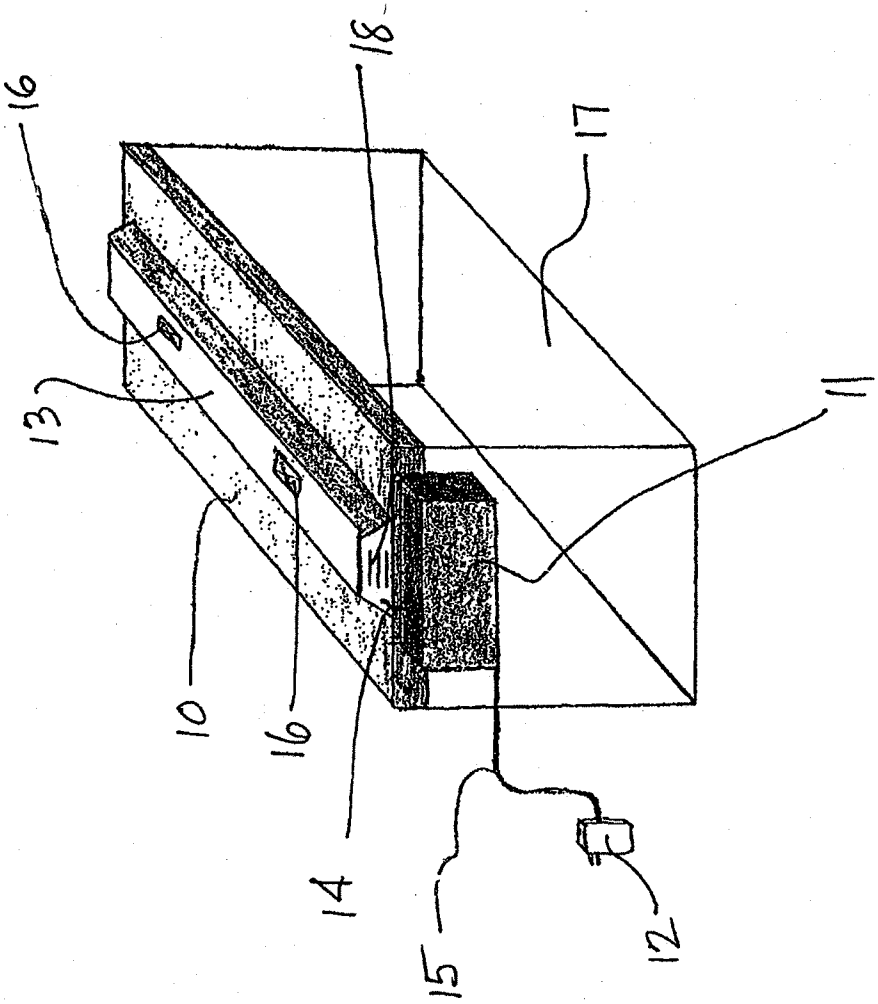


Figure 1

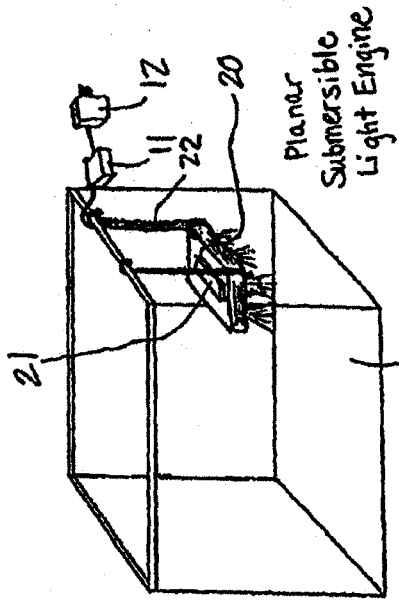


Figure 3

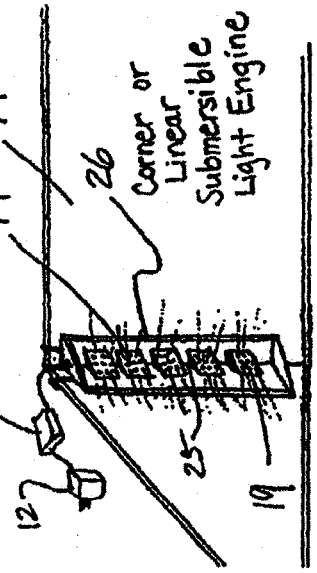


Figure 5

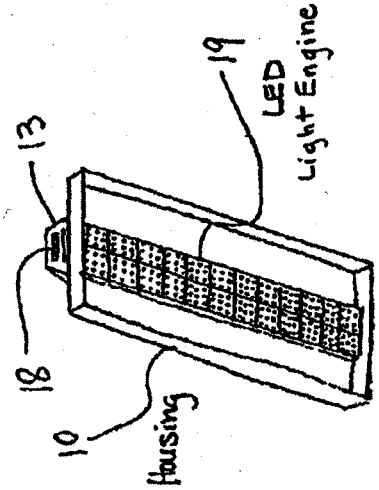


Figure 2

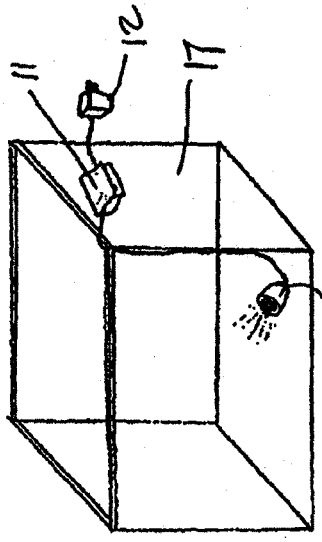


Figure 4

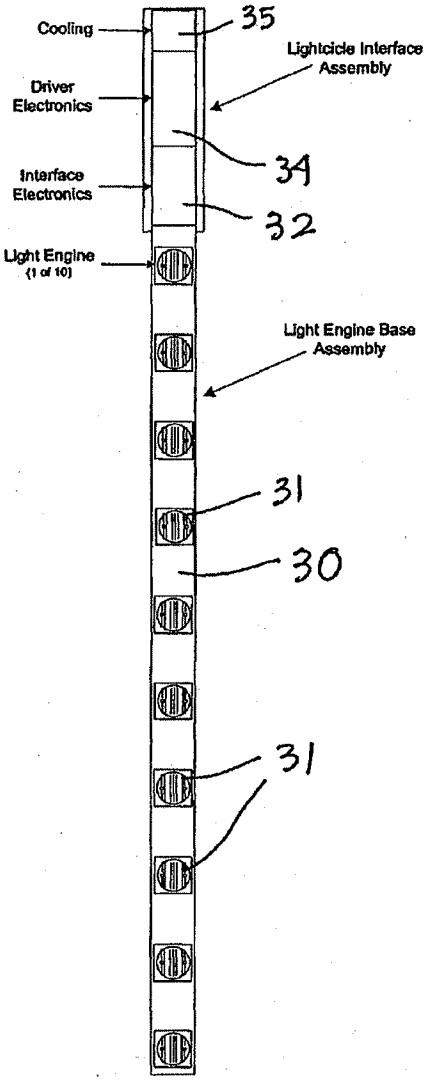


Figure 6
Lightcicle Basic Structure

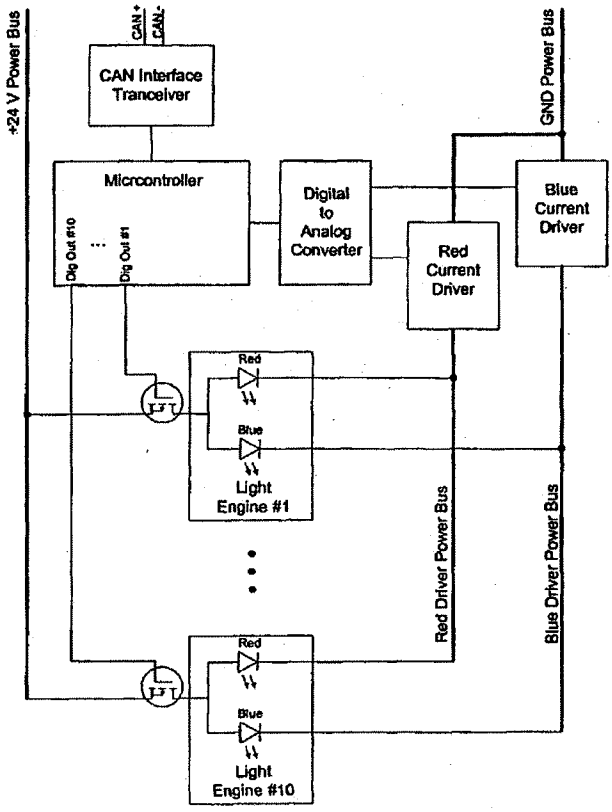


Figure 7
Interface and Driver
Electronics Block Diagram

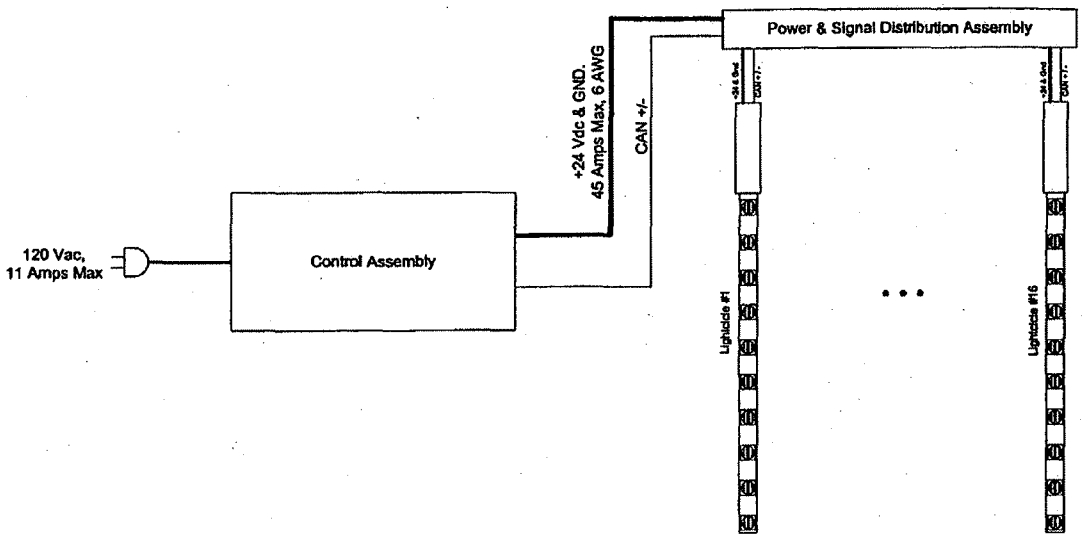


Figure 8
Quadrant System Components and Interconnects

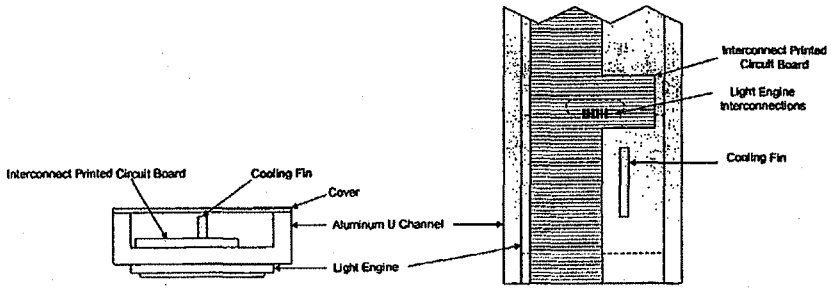


Fig. 10 Fig. 9

Light Engine Base Assembly Details

MARINE LED LIGHTING SYSTEM AND METHOD

CROSS REFERENCE TO RELATED APPLICATION(S)

This application claims the benefit of U.S. Provisional Application No. 60/529,645, entitled "Aquarium Lighting System for Marine Growth, filed on Dec. 15, 2003, the subject matter of which is hereby incorporated therein by reference in its entirety.

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates generally to a lighting system and method for marine growth and more specifically to a light-emitting diode-based (LED) lighting system that delivers programmable spatially and spectrally controlled light with the ability to provide optimal spectral output for sustenance and growth of marine life.

2. Description of the Prior Art

There are many lighting systems currently available that either promote growth for land-based plants or are used for decoration or illumination of marine life. However, none of the prior art describes a system for promotion of marine life using light-emitting diode based lighting.

Plant growth lighting systems and apparatus are common in many fields that include crop production, germination, tissue culture growth, horticulture, landscape architecture, and specialty growth systems. Although these systems provide for support of plant growth and development in terrestrial applications, none is suitable as a growth system for plants in aquatic settings. For productive growth, marine plants and animal life such as coral and algae require (at least in a limited manner) light of a specific intensity and within a specific range of wavelengths. Light quality and quantity are degraded as you go deeper in water which can preclude healthy sustenance at depths below a few feet without powerful lighting systems.

Marine growth apparatus are available for cultivating or permitting the growth of marine life. These systems typically consist of structures that provide a surface that permits the growth of coral, algae and other marine life, or provide a portable or permanent habitat for marine life to grow within. These include systems that are used for artificial coral reef development, coral reef regeneration, harvesting of marine life for food, and marine aquaculture for jewelry and ornamental aquariums. These inventions are typically passive apparatus that rely on natural solar light for illumination and do not use spatially or spectrally controllable artificial lighting to promote or accelerate growth.

Finally, aquarium lighting systems are also common and include light sources using fluorescent, incandescent, metal halide or light emitting diodes. These systems can be classified into two types. In type one, the primary purpose is to provide illumination to an underwater space. They contain a housing, light source within said housing, and means of power supply or connection to power supply. The light is not spatially controllable, but instead attempts to provide a consistent intensity above an area of the marine habitat. These systems use fluorescent, incandescent or metal halide light sources, which provide low intensity light with high radiant heat output and no user-defined spectral control. Maintenance is required on these systems (through light source bulb replacement) to maintain light intensity over time.

In type two, the primary purpose of the lighting system is to provide decorative lighting, including artificial moon light or colored lighting, to the marine landscape. These systems are not intended to provide sufficient quantity of light and are only supplemental to other light that supports healthy sustenance and growth. They contain a housing, a colored light source usually consisting of light-emitting diodes, lasers, color wheels or filters combined with a light source, or ultra-violet illumination, and a power supply or connection to power supply. They may or may not be portable or submersible systems that direct light at specific marine features.

Neither of these two types of marine lighting systems and apparatus is designed with an LED source offering spatial control of spectral output which can allow a user-defined or preprogrammed appropriate spectrum for growth of specific marine plant and animal life. Though the above are satisfactory for their designed applications, there is a continuing need for a marine lighting system that can be used to promote marine plant and animal life while offering the user spatial and spectral control.

DESCRIPTION OF THE INVENTION

The present invention provides a lighting system for marine growth and more specifically to a light-emitting diode-based (LED) lighting system that delivers spatially and spectrally controlled light with optional optimal spectral output for growth of marine life. Such systems are particularly applicable to photobioreactors, fish hatcheries and aquariums, among others. Improved growth is achieved due to user programmable spectral and spatial control of light to allow for organism-specific lighting conditions with optional portability and submergibility for even greater light intensity delivery.

LED lighting technology is able to deliver high intensity light into a marine environment in a new way when compared to traditional systems. The use of LEDs enables the system to independently control the intensity of each spectral component as a function of time. This allows a user to provide the optimal wavelengths between 380 nm to 690 nm used by specific marine plant and animal life to support photosynthesis and/or optimum biological development. It provides a single controllable system which can also be used to simulate natural lighting conditions including sunrise, daylight, sunset and moonlight to provide a natural growth cycle, or to alter the lighting schedule to enhance growth during a particular phase of species development. Specific wavelengths can also be programmed to enhance the fluorescence and colors of certain species of fish and coral.

This system's LED lighting is provided with much greater intensity and lower radiant heat that traditional fluorescent-based lighting systems, changing the formerly high cooling requirements of a complete marine habitat. Another feature of this lighting technology, which is important for promoting and sustaining marine life, is that it does not experience degradation of wavelength with age as does fluorescent lighting. Fluorescent's loss of light intensity over time reduces the growth rate of certain species of marine life by minimizing the photosynthetic energy provided. These variations can also lead to the appearance of certain types of organisms such as cyanobacteria in marine habitats that occur as different light wavelengths are emitted from degraded fluorescent tubes.

In addition, LEDs are much more efficient than incandescent lamps and equal to or slightly more efficient that most fluorescent lamps. Safety of the system will also be improved due to low operating voltages and less heat dissipation. The lack of glass bulbs in the system when compared to all other light sources also improves safety by eliminating the explosive failure mode of previous systems.

Specific to the design of this system, the LED light engine can be housed in a waterproof system that, unlike traditional systems, can be submersed into the marine environment. The ability to secure high intensity lighting at any point within the environment enables light to be directed at marine life features that reside at depths far from surface top-mounted lighting. Marine plants and animals require specific light intensity for optimal growth. By providing a means to deliver light of greater intensity, lower power-usage and lower thermal delivery deeper in a tank than comparable overhead lighting, better growth of plant and animal life can be achieved at depths previously unable to sustain some types of marine growth.

In general, the system of the present invention includes LED lighting, a controller, a power supply, a light housing, and a cooling system. Optional software can be included to provide users with complete programmable control of spectral, spatial, intensity or pattern of light output. The LED lighting consists of small light engines that are configured into a non-submersible top or side lighting system, or used independently to create a submersible planar, point, or line source of light. The LED light engine consists of a cluster of light-emitting diodes, including both chip, organic and discreet LEDs dependent on the preferred embodiment of the system. The control system can be configured with or without closed loop control, and is the mechanism that allows for user or manufacturer programming of lighting period and pattern, spectral content, or spatial content of the light delivered. The cooling system uses either natural convection with the air to dissipate heat in a top-mounted lighting system, or through water cooling via conduction, forced water cooling or an air-water loop to cool the submersible lighting configurations.

DESCRIPTION OF THE DRAWINGS

FIG. **1** is an isometric view of the marine lighting system in accordance with the present invention embodied in a top or side-mount configuration.

FIG. **2** is an isometric view of the light engine and configurable housing configuration of FIG. **1**.

FIG. **3** is an isometric view of the marine lighting system embodied in a submersible planar light source configuration.

FIG. **4** is an isometric view of the marine lighting system embodied in a submersible point light source configuration.

FIG. **5** is an isometric view of the marine lighting system embodied in a submersible linear or corner light source configuration.

FIG. **6** is an elevational front view of a lighting system in accordance with the present invention with a plurality of vertically spaced light engines.

FIG. **7** is a block diagram for the controller interface and driver electronics.

FIG. **8** is a view showing a lighting system in accordance with the present invention with a plurality of vertically oriented series of light engines.

FIG. **9** is a top fragmentary view of a portion of a light engine base, with the cover removed.

FIG. **10** is an elevational end view of the light engine base shown in FIG. **9**, with the cover in place.

DESCRIPTION OF THE PREFERRED EMBODIMENT

All of the preferred embodiments of the invention include a light source, a light source housing, a power supply, a controller, connection cables, mounting hardware and (when necessary) cooling system.

In the first embodiment, the lighting system is configured into a nonsubmersible light source as shown in FIG. **1**. The use of LEDs for top-mounted lighting configurations produces a low profile size system when compared with current incandescent, fluorescent or metal halide-based lighting systems. In addition to its lower profile size, this configuration will operate with considerably less noise and radiant heat output than comparable fluorescent or metal halide systems.

In FIG. **1**, the housing **10** is mounted to the top of a marine habitat and is connected to the controller **11** through a connection cable **14**. The controller **11** can include an optional port for a user connection to a computer that will enable users, through software, to program spatial, spectral and intensity controls. The controller is then connected through a power cable **15** to either a low or high efficiency power supply **12** dependent on user options. Attached to the housing is a fan-based cooling system **13**. The system **13** includes a fan housing with one or more fans **16** and a plurality of air inlet vents **18**. During operation, the fans **16** draw ambient air through the vents **18** to cool the LED light sources within the housing **10**. The housing **10** also includes mounting hardware for attachment of the housing **10** to the top or side of the marine habitat **17**.

The controller **11**, which will be described in greater detail below, can come preprogrammed into a spectral and spatial configuration to sustain and enhance marine plant and animal life, or the settings can be accessible by the user. The controller can be programmed into a closed loop system to react to local lighting, temperature, or other environmental factors. It can also provide one-way user-programmable control of the lighting period, the spectral content, the spatial control, or the intensity control.

FIG. **2** shows a detail of the LED light engines **19** and housing **10**. The light engines **19** are constructed on moveable components that allow a user to control their placement on the mounting bars of the light housing **10**. A user can configure their overhead or side lighting to provide equal illumination and intensity across the entire top portion of the enclosure, or alternatively, to configure patterns or areas of greater light intensity.

Each of the light engines **19** is made up of a plurality or an array or cluster of individual LEDs. Each of the individual LEDs is capable of providing a predetermined variable intensity of light (depending on the applied power) at a predetermined wavelength when provided with a power source. In accordance with the present invention, the individual LEDs have intensity levels which, when combined in a light engine, provide a light engine **19** which is capable of producing light intensity of between 0 and about 1000 or more micromols per square meter per second, and more preferably between 0 and about 300 micromols per square meter per second. Each individual LED also preferably emits colors of light at a wavelength within the spectral range of 380 nm to 690 nm. In other words, each of the individual LEDs emits light of a wavelength in the red through the blue region of the spectrum. Although the preferred embodiment utilizes LEDs which emit light in the 380 nm to 690 nm region of the spectrum in the form of red, blue and/or green light emitting LEDs, LEDs emitting other

colors could be utilized as well. The light engines, and in particular each of the individual LEDs, is driven by a power source which, in the preferred embodiment is 24 volts of direct current. The particular quantity of each type of LED in each light engine **19** depends on the marine life to be sustained. To sustain certain species of marine plant life, each engine might include at least about 50% red emitting LEDs and at least about 30% blue emitting LEDs.

In the embodiment shown in FIG. **3**, an LED light system comprised of one or more light engines has been mounted in a planar configuration, equivalent to those components used in the top and/or side mount configurations of FIGS. **1** and **2** to comprise a large overhead lighting system. In this case, a series of light engines is contained in a submersible, transparent watertight housing **20**. The housing **20** is preferably combined with a heat circulation system **21**. The system **21** includes water inlet and outlet ports to dissipate the heat from the LED via the surrounding water. Mounting hardware **22** is included to attach the housing **20** to the sides of the marine habitat **17**. Attachment means may also be provided to attach to the housing **20** from the bottom of the habitat **17**, or to suspend the housing **20** from the top of the habitat **17**. This embodiment will allow for planar light distribution from any angle or depth into the marine environment. The intensity and spectral content of the light from the light engines can be controlled, via control of the individual LEDs within that light engine, to either specific requirements for a particular marine life or to simulate surface lighting at a lower depth.

In the embodiment shown in FIG. **4**, an LED light cluster **24** has been mounted into a point configuration. It is contained in a submersible, transparent watertight housing. This light cluster **24** or light engine comprises a plurality or array of individual LEDs which are controlled or described. The housing may be combined with a heat circulation system to dissipate the heat from the light cluster **24** or engine out of the surrounding water. Mounting hardware is provided to attach the light to the sides of the habitat **17**. Means may also be provided to attach the housing to the bottom or suspend it from the top of the habitat **17**. This embodiment will allow for directed, controllable light to be isolated on a particular feature in the marine landscape that requires light of a specific intensity or wavelength to sustain or support its growth.

In the embodiment shown in FIG. **5**, a number of LED engines **19** have been mounted into a linear configuration on a mounting rail **25**. The rail **25** is contained within a submersible, transparent watertight housing **26**. The housing **26** is preferably combined with a heat circulation system to dissipate the heat from the LED out of the surrounding water. Mounting hardware is included and intended to provide attachment of the light along the sides of the marine habitat **17**. This mounting system offers users the ability to light a section of the habitat along a depth or length and provide spatially or spectrally controlled lighting unobtrusively within the marine landscape.

The control for the light system of the present invention is designed to control the activation (on/off) status of each type of individual LEDs within each light engine and when activated (on), to control the intensity of each type of the individual LEDs within each light engine. Further, because each type of the individual LEDs emits its own particular wavelength of light, the spectral content or quality of each light engine is also controlled. In this way, both the intensity and the spectral content or quality of each light engine is controlled. More specifically, the control system is designed to provide independent control of the intensity of each spectral component as a function of time for selection of optimal wavelengths between about 380 nm to about 690 nm used by specific marine plant and animal life to support photosynthesis and optimal biological development.

The planar mounted design of FIGS. **1** and **2** is designed to provide a single controllable system to best simulate natural lighting conditions including such things as sunrise, daylight, sunset and moon light to provide a natural growth cycle for any marine life. Such a system may also be used to alter the lighting schedule to enhance growth during a particular phase of species development.

The submersible embodiments of FIGS. **3**, **4** and **5** give the ability to provide high intensity lighting at any point within the habitat environment. This enables light to be directed at marine life that resides at depths far below the natural surface lighting or the top mounted lighting of FIG. **1**. By providing submersible light sources such as shown in FIGS. **3**, **4** and **5**, better growth of plant and animal life can be achieved at depths previously unable to sustain some types of marine growth. With the submersible embodiments of FIGS. **3**, **4** and **5**, the lighting system can be integrated into a photobioreactor to create layers of light throughout a growing environment, effectively doubling or tripling the surface area for growth of organisms such as algae.

The basic system of construction is for a series of LED light engines to be spaced along each required one foot length. Preferably, each light engine contains a combination of individual LEDs, with each type of LED emitting its own particular wavelength, preferably between 380 nm and 690 nm. Each light engine preferably includes in excess of 100 total LEDs per square inch of light engine surface. The particular percentage of each type (i.e., wavelength type) of LEDs will depend on the specific marine life to be sustained and promoted. It is also contemplated that each light engine would also carry two photodiodes which may be used for closed loop light output control or as part of a plant growth detection/light engine engagement system.

Underwater lighting systems used for microalgae growth are also inherently subject to algae bloom or photosynthetic bacteria on the lighting surface. Therefore, a level of opaqueness may be experienced at different underwater light levels. This will dictate if the addition of a cleaning system is required by the user. If it is, the design can include the addition of low level ultra-violet LEDs to inhibit growth at the lighting surface without interfering with marine growth. Further, the housing used in the embodiments described above is produced with a non-leaching antibacterial plastic coating to inhibit growth at the lighting surface. As an alternative, the housing can be provided with a mechanical cleaning mechanism to periodically "wipe off" organisms from either an enclosed or non-enclosed lighting surface.

The control system preferably contains output controls and a main DC power supply to support a single light engine or a series of light engines. A microcontroller within the control assembly will read the control settings and the timer output and send appropriate signals to all light engines over the controller area network (CAN) bus.

On the outside of the control system, individual slider controls are provided to adjust the output irradiance of each spectral element independently. It will also include an illumination level control switch that will allow the user to manually select the number of light engines which are illuminated. A simple programmable digital timer may be provided to control day/night illumination cycles.

The power supply is a 1500 W, +24 Vdc power supply. The AC input for the power supply may be standard 120 Vac wall outlet power or 220 Vac at the users requirement. Twenty-four volt output power from the power supply will be routed to the power and signal distribution assembly. This assembly will provide the connection points to distribute power to each of the light engines as well as the required fusing. One low current fuse will be provided for each group of two light engines. In addition to power distribution the assembly will facilitate routing of the CAN bus signals to each of the light engines.

The interface electronics of the control system include control signals delivered over a two wire (CAN) bus from the main system controller to the light engine interface microcontroller. Command messages will control the number of light engines to be energized as well as the individual wavelength output intensities. Since each light engine can be individually controlled via control of its individual LEDs, the user is able to create lighting effects that mimic additional colors of light, including white, purple, etc. The driver electronics that control these individual selections consist of individual light engine selection switches and independent wavelength linear current drivers. Power to the driver electronics is provided by a two wire pair (+24 volt and ground) from the power and signal distribution assembly in the controller.

For those embodiments that have a fan/air cooled system, a small cooling fan will be mounted to the top of each light engine system. Air will be drawn from the bottom of each light engine system, through the internal cooling channel, over the driver electronics and exhausted through the top of the unit.

FIG. **6** shows the basic structure of a lighting system in accordance with the present invention with a series of vertically spaced light engines. Specifically, the structure of FIG. **6** includes a light engine base assembly **30** and a plurality of vertically spaced LED light engines **31**. When used, the entire base **30** and the light engines **31** would be mounted within a housing having a substantially transparent surface. Because this is primarily an underwater or submersible structure, the housing would be watertight. The interface electronics **32**, the driver electronics **34** and the cooling mechanism are provided at the top of the light engine base **30** as shown.

FIG. **7** shows a block diagram for the control interface and driver electronics.

FIG. **8** is a schematic diagram showing a control assembly and a powered signal distribution assembly for controlling a series of vertical LED light strips of the type shown in FIG. **6**.

FIG. **9** is a detailed view of a portion of the light engine base and connected light engine. Specifically, the base **30** is comprised of an aluminum U channel and includes a cooling fin, an interconnect for a printed circuit board and the interconnections with the light engine.

FIG. **10** is an end view of the light edge and base of FIG. **9** and shows similar elements.

Accordingly, the present invention is directed to an LED light system and method for controlling light to promote and/or sustain marine life (either plant or animal) in a marine habitat. The system includes one or more light engines mounted to a housing. If the system is designed to be submersible, the housing must be watertight. Each light engine is made up of a plurality or an array of individual LEDs (preferably at least 50 and more preferably at least 100). Each of these individual LEDs emits light at a particular wavelength, with all LEDs emitting a similar wavelength comprising a "type" of LED. In the preferred embodiment, these wavelengths are in the 380 nm to 690 nm range and comprise one of red, blue or green, although other colors could be used as well. Each type of LED within a light engine is capable of being activated (on) or deactivated (off) and, when activated, each type of LED is capable of having its intensity varied as a result of providing variable power.

Each light engine, and in particular each type of LED within a light engine, is operatively connected to a power source through a control system. The control system is designed to control each type of LED within a light engine, and thus control the light output of each light engine. Specifically, the control is designed to control the activation status (on/off) of each type of LED and, when activated, the intensity of each type of LED. In this way, the intensity and the spectral quality or content of each light engine can be controlled.

The method aspect of the present invention includes providing a housing with an LED light source mounted thereto. Such LED light source would preferably include one or more light engines made up of a plurality or array of individual LEDs as described above. The method would also include providing a power source and controlling the illumination of the light engines via controlling the activation status and the intensity of each type of LED therein.

The invention claimed is:

1. A combination marine habitat and lighting system therefor comprising:

a marine habitat having an open top defined by a top edge and

a lighting system including:

a housing connectable to said top edge to substantially cover said open top, said housing further including an inner side facing said open top when said housing is connected to said top edge and an opposite outer side;

an LED light source mounted to the inner side of said housing, said LED light source comprising at least one light engine having a plurality of individual LEDs capable of providing light at a wavelength from about 380 nm to about 690 nm;

a power supply sufficient to drive said LEDs;

a controller connected with said power source for controlling the activation status and the intensity of one or more of said individual LEDs; and

a cooling system provided in said housing.

2. The combination of claim **1** wherein said LED light source, when activated, is sufficient to support marine growth.

3. The combination of claim **1** wherein said LED light source includes at least one of chip-based, organic or discreet LEDs.

4. The combination of claim **1** wherein each of said light engines is capable of providing light intensity of from 0 to 1000 micro mols per square meter per second.

5. A lighting system for a marine habitat of the type having an open top defined by a top edge, said lighting system comprising:

a housing connectable to said top edge to substantially cover said open top, said housing further including an inner side facing said open top when said housing is connected to said top edge and an opposite outer side;

an LED light source mounted to the inner side of said housing, said LED light source comprising at least one light engine having a plurality of individual LEDs capable of providing light at a wavelength from about 380 nm to about 690 nm;

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a power supply sufficient to drive said LEDs;

a controller connected with said power source for controlling the activation status and the intensity of one or more of said individual LEDs; and

a cooling system provided in said housing.

6. The lighting system of claim **5** wherein said LED light source, when activated, is sufficient to support marine growth.

7. The lighting system of claim **5** wherein said LED light source includes at least one of chip-based, organic or discreet LEDs.

8. The combination of claim **5** wherein each of said light engines is capable of providing light intensity of from 0 to 1000 micro mols per square meter per second.

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